Content Management System as a Web Application Solution: A Case Study

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Abstract
This study presents a solution for managing and maintaining Web content by introducing a content management system (CMS) as a platform for Web applications. Properly managed Web content requires a working knowledge of the Web application, and good practices, ensuring website integrity is maintained. The problems are, all users may not be as competent as others, and some may not follow proven practices which prevent integrity issues, causing further delays of website availability. Introducing a content management system in the form of a CMS based Web application will help prevent the problems associated with website structure and management. This study used Joomla, a content management system Web solution, as a platform to develop the Coalition for Healthy Kids website, demonstrating that a CMS is a logical solution to maintain website integrity under conditions of constant reorganization and editing, making it easier for visitors to navigate the website.

1. Introduction

A Web site where content is constantly changed, scheduling tools added, and sections deleted or expended, can become overwhelming to the user, the complexity of the Web site too difficult to maintain. Also, as more content is added, builds onto this complexity, reaching a point where Web site management becomes an unstructured task of trial and error. Even with structured frame layouts, forms, and cascading style sheets, mismanaged changes can have disastrous consequences to the Web site’s integrity – normal navigation and embedded applications can become erratic, even fail to function.

Web site content management is of great importance, it can be overlooked as the deciding factor to the success of the site. Regardless of how well the Web site is designed, a simple displacement of content can be hard to locate, depending solely on visitors to provide feedback of Web site issues encountered during browsing. Web site integrity issues should not be a burden placed onto Web site visitors to stumble upon. There has to be a solution to assure Web site content management is functionally structured, and that it provides a record of that structure, supporting the Web site and its entities.

The solution to this problem is to use a method which maintains a structured record of the Web site during development, after deployment, and as an ongoing usable editing tool. A similar methodology currently in use, which has proven its usefulness maintaining a structured record of entities, is a card catalog, used in libraries around the world. Card catalogs maintain a logical structure by keeping a register of bibliographic items located in a library, group of libraries, even a network of libraries. Although hardly used these days, the card catalog was used as a method of structure to locate items. Today, computers and content management system software are used to achieve the same functions of the card catalog, but is more functional, providing a graphical hierarchy to ensure integrity, easy to maintain, and update.

For Web site development and management, Joomla, a dynamic portal engine and content management system web application, will enable a structured Web site solution. As a content management system (CMS), Joomla enables you to build Web sites and online applications, with the flexibility of tracking, maintaining, and extending content. Joomla is open source, providing input, revisions, and a wealth of information from users and developers. It can be download and used freely under the GPL license, and is available for many OS platforms (i.e., Microsoft, and UNIX). Recommended applications to successfully run Joomla are: web server (i.e., Apache, Microsoft IIS), a scripting language (i.e. PHP), and a database (i.e., MySQL). As our team develops a Web site using Joomla, the benefits of its CMS based platform are evident.

2. Open Source Software

In general, open source refers to any program whose source code is made available for use or modification as users or other developers see fit. Open source software is
usually developed as a public collaboration and made freely available. Open Source is a certification mark owned by the Open Source Initiative (OSI). Developers of software that is intended to be freely shared and possibly improved and redistributed by others can use the Open Source trademark if their distribution terms conform to the OSI's Open Source Definition. To summarize, the Definition model of distribution terms require that:

The software being distributed must be redistributed to anyone else without any restriction

The source code must be made available (so that the receiving party will be able to improve or modify it)

The license can require improved versions of the software to carry a different name or version from the original software

Open Source is the result of a long-time movement toward software that is developed and improved by a group of volunteers cooperating together on a network. Many parts of the Unix operating system were developed this way, including today's most popular version, Linux. Linux uses applications from the GNU project, which was guided by Richard Stallman and the Free Software Foundation.

2.1. Content Management System CMS

A content management system (CMS) is a system used to manage the content of a Web site. Typically, a CMS consists of two elements: the content management application (CMA) and the content delivery application (CDA). The CMA element allows the content manager or author, who may not know Hypertext Markup Language (HTML), to manage the creation, modification, and removal of content from a Web site without needing the expertise of a Webmaster. The CDA element uses and compiles that information to update the Web site. The features of a CMS system vary, but most include Web-based publishing, format management, revision control, and indexing, search, and retrieval.

The Web-based publishing feature allows individuals to use a template or a set of templates approved by the organization, as well as wizards and other tools to create or modify Web content.

The format management feature allows documents including legacy electronic documents and scanned paper documents to be formatted into HTML or Portable Document Format (PDF) for the Web site.

The revision control feature allows content to be updated to a newer version or restored to a previous version. Revision control also tracks any changes made to files by individuals. An additional feature is indexing, search, and retrieval. A CMS system indexes all data within an organization. Individuals can then search for data using keywords, which the CMS system retrieves.

A CMS system may also provide tools for one-to-one marketing. One-to-one marketing is the ability of a Web site to tailor its content and advertising to a user's specific characteristics using information provided by the user or gathered by the site (for example, a particular user's page sequence pattern). For example, if you visit a search engine and search for "digital cameras" the advertising banners will advertise businesses that sell digital cameras instead of businesses that sell garden products.

Two factors must be considered before an organization decides to invest in a CMS. First, an organization's size and geographic dispersion must be considered especially if an organization is spread out over several countries. For these organizations, the transition to CMS is more difficult. Secondly, the diversity of the electronic data forms used within an organization must be considered. If an organization uses text documents, graphics, video, audio, and diagrams to convey information, the content will be more difficult to manage.

2.2. Joomla Overview

Joomla is a free CMS written in PHP. It is a widely used, well-documented application with a broad user-base and active community. Sites that use Joomla include MTV Networks Quizilla (www.quizilla.com), IHOP restaurants (www.ihop.com) and Harvard University's Graduate School of Arts and Sciences (http://gsas.harvard.edu) [1]. It allows administrators to install the application through the browsers. All that is required is a Linux server running Apache with PHP and MYSQL installed. Basic functionality and an extensive array of customization options are available in the administrator tool. The average user can install and customize Joomla with minimal technical logic and skill.

Figure 1 show the official website for Joomla, where the software can be downloaded and used under the GPL.

Figure 1. Joomla software resource webpage

The CMS is accessed by appending “/administrator” to the URL for the location in which the application is installed. The public-facing site can be accessed by hitting the URL for the location in which the application is installed.
Joomla allows administrators to create and organize content according to their needs. Joomla offers several different content templates categories and many with different implementation options of each template. It also offers many customizable elements for each. Examples of template categories include search results, contact pages, web links, and articles. Specific implementations for these categories include Article Category List Layout, Article Archive List, Standard Contact Layout, and Contact Category Layout. Joomla is a powerful content management system because it allows administrators to publish not only articles but pages for other commonly used page types as well.

Another significant element of Joomla is its ability to allow user registration. Users can register and log in to the website to view content available only to registered users as well as receive emails sent by administrators. Users can be arranged into one or more groups that can receive emails specifically to that specific group.

Administrators can customize the information architecture of their site with the many options Joomla provides for menus and right and left rail content. Joomla allows administrators to create and populate default with content internal and external to the site. Administrators can also create modules that populate the right and left rails of a page to contain menus, lists dynamically-generated and static content. Users can display these menus and modules on all, no or specific pages.

Joomla also allows users to select from a variety of free and paid-for templates to customize the interface of the users’ site. Different templates not only have superficial differences in header images and page colors, but also significant differences in layout. Though many free and paid-for templates exist for download, it is also possible for users to create their own templates [2].

Joomla is not simply a content management system but an open-source application that allows administrators to extend standard functionality to meet the specialized needs of each website. The source code is available and editable so developers may change the PHP, CSS and config files that are standard to Joomla. As shown in Figure 2, many add-ons, called extensions, are freely available. Others must be purchased. Example extensions allow users to book reservations, supporting Google ads, user forums and multi-language support.

Figure 2. Extensions can be found to add more features to match one’s needs.

Joomla also allows developers to write their own extensions to an even deeper level of customization. Developers can build modules and templates in PHP with a MYSQL database that meet the specific needs and requirements for their site.

A great benefit of using Joomla is the endless discussion forums and online support and troubleshooting websites that offer great help guiding the user though the process of using Joomla, as seen in Figure 3.

Figure 3. Joomla offers online support with a combination of forums and discussion boards.

3. Methodology

We have successfully installed Joomla version 1.5 on Pace’s Vulcan server, as well as Northern Westchester Hospital’s production server and have implemented a user-friendly and useful site with Joomla.

Administrators can write, edit and arrange articles; create and store several home content options; create and edit events; add and delete external links, update contact information and update media to be used throughout the site.

To create a new article, administrators can select the “article manager” from the content menu or the “Add New Article”. In this screen, administrators must enter an
article title, an alias (which will be the SEO location of the article). It is also necessary to select a section. This should always be article. Administrators must assign articles to a specific category as all articles are grouped by category. The form for entering articles is rich text, which allows administrators to embed media and offers a wide variety of stylistic tool, accessible via icons at the top of the form. Administrators can also choose to publish or not publish an article at this time and also to make it available as content for the front page. In the right rail administrators can assign an author to the article, and select preferences about making the title linkable, displaying the author name and date, among other options.

Once articles have been assigned as FrontPage articles, administrators may also edit and manage these articles from the Front Page Manager. This is available from the main screen or from the Content menu. In this tool administrators can manage articles that have been set as FrontPage content. Articles can be published or unpublished from the homepage and deleted from the list of possible database articles.

The media manager allows administrators to upload, organize and delete media to be used throughout the site. This can be accessed from the Media Manager button on the main page or from the site menu.

We have installed the JEvents extension to allow the administrators of the Coalition for Healthy Children to publish and organize events. JEvents allows administrators to display calendars by various views, including by day, week and month. Administrators can create events by selecting the events element in the Components menu. Administrators can also customize the default view of the events calendar (by month, day, week etc).

JEvents also comes with a module for displaying the latest events and a mini calendar.

Joomla contains a content category for links pages. We have configured the links page to use this format. Administrators can add, delete and manage links by selecting weblinks from the Components Menu. This is also possible through the user-facing site for logged-in publishers.

Joomla also contains a content category for contact pages. We have configured the contact page to use this format. Administrators can add, delete and manage contact information by selecting Contacts from the Components menu. This installation of Joomla also allows administrators to send emails. They may be sent individually or to distribution lists of registered users and fellow administrators.

4. Case Study

We have chosen to use Joomla, an open-source content management system (CMS), to develop a site for the Coalition for Healthy Children to use existing technologies to provide a site that meets the needs of the organization.

First-time users entering the site can easily get a sense of the purpose and content of the site from the homepage. The top navigation bar provides users with a general overview of the architecture of the site. It allows users to easily access the main categories of content: articles, the events calendar, external links and contact information.

4.1. Homepage

The modules on the homepage allow users a way to directly access more specific and hopefully more pertinent information as shown in Figure 4. The Latest Events module displays event information for events occurring within the next week. Users can click on a specific event to view more details about the event as well as view other events on the calendar. The Featured Articles module lists various topical article titles a user can click to view as well as a link to all articles. This module grabs the attention of users and provides them another entryway. The homepage also provides users with interactive elements. From the login module users can log in or link to a page where they can create an account and sign up for various different newsletters, according to their interests. A poll also allows users to interact with the site, chime in on a children’s health-related issue and view results from the poll.

![Figure 4. Home page.](image)

4.2. About

Figure 5 illustrates the about section, provides information about Northern Westchester Hospital and the
Coalition for Healthy Kids. It uses Joomla’s individual article layout.

4.3. Updates

The default updates section contains news and updates on information relevant to users in a list format. This section uses Joomla’s section blog layout. All articles within the news section are published here in a blog format, with the introductory text of each update viewable in the list. If the update is longer than the introductory text, users can click to the individual news page to read the full article.

4.4. Archive

The default archives page lists the three most recently published articles in each category, organized by category, as shown in Figure 6.

Each article on the default archives page is listed with introductory text. Users may click on the article title to read the full article. Full article pages use Joomla’s article layout.

Clicking on the category title will take users to the landing page for each category. On these pages all articles published within that category appear with introductory text. When a user clicks on the article title they are taken to the full text page of the article. The category landing page implements Joomla’s category list layout.

4.5. Calendar of Events

Figure 7 illustrates the default view of the Calendar of Events, which is a monthly view. This allows users to see a range of events that balance proximity and breadth. Event name, time, and location are displayed in the calendar and can be clicked for more information. Events are grouped into categories with a category key in the left module to guide the user. The calendar layout and functionality are provided by third party extensions, JEvents. We have modified the default css for the JEvents extension to match the color scheme of the rest of the site. The calendar of events also allows users to search for certain events based on a specific year, month, or the current day as seen in Figure 8.

Each category within the articles section is displayed on this page. This layout is not a default Joomla layout. Joomla allows users to list all, or a selected number, of articles within a section or category or all, or a selected number of categories within a section. We have modified the default Joomla section blog layout code to meet the client’s desires for the current layout.
4.6. Resources

The resources page provides the user with useful external links related to issues of children's health. They consist of two categories: Downloads and Links. This layout is not a default Joomla layout. Similar to articles Joomla’s default information architecture allows administrators to display all weblink groups on a page, which are linkable to a page of all weblinks per group. We have modified the default Joomla code to accommodate the client’s requirements of allowing all weblinks organized by group to appear on the resources page, shown in Figure 9.

4.7. Contacts

We have modified the contact layout page to simply include a form that sends an email with comments to admin@healthykids-now.com with the ability to email a copy of this message to the user’s email, as shown in Figure 10.

4.8. Back End

The Back end of Joomla allows you to manipulate the site and customize it with extensions. Figure 11 illustrates the Control Panel from where administrators will maintain the website.

One example of the many features Joomla provides is the Article Manager. As shown in Figure 12, it allows the administrator to publish the articles, show them in a certain orders, and categorize them.
Figure 13 illustrates the Acajoom newsletter Joomla component. The control panel of the Acajoom component controls mailing lists, subscribers list, and mail administration functions [3].

![Acajoom Component Control Panel](image1.png)

### 5. Other CMS

As we selected Joomla for this project, there are other CMS solutions available, depending on the preference of the user from free to commercial [4], as seen in Figure 14.

![List of CMS along with their configurations](image2.png)

### 6. Conclusion

Joomla is a useful tool to allow web developers to quickly build a CMS-powered web site. Joomla’s inherent information architecture allows for many of the common elements of contemporary information architecture, web link lists, article lists, and article pages. It allows for commonly used functionality, such as clickable article and section titles and RSS feeds. Layouts are flexible, allowing for right- and left-rail content as well as banner and footer content. Extensions and designs created by third-party developers allow developers to easily add useful functionality and change the design of his site. Developers can created their own designs and extensions to meet specific needs that have not already been adequately met by other developers.

Joomla does fall shorts in several aspects. Its main pitfall is its information architecture. While flexible to an extent, it is very narrow in scope. By default it allows a drill-down architecture that may be too simplistic for more complex, contemporary sites. These sites need more flexible content organization structures. Even relatively small sites, such as the one built in this study require more flexibility than Joomla currently offers by default. Developers must not only add on the existing functionality but must correct flaws in the default architecture provided by Joomla.

### 7. References

[1] What is Joomla  
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[4] Other Open Source CMS  
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