

HEI - A HIGH EDUCATION INSTITUTIONS ORIENTED CONTENT MANAGEMENT SYSTEM

Making Easy the Web Content Publishing for High Education Institutions

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Abstract: This work presents a content management system (CMS) oriented to high education institutions, allowing the optimization of the internal web publishing processes in a way that encourages the uniformity of the information exhibition on the Web. Our CMS tool also enforces that the portal of the institution must be the starting point for any resource offered by the many faculties of the Institution. We applied our CMS tool to develop the portal of a high education institution and this case study has shown the efficiency and practicability of our approach.

1 INTRODUCTION

Content Management Systems (CMS) are tools that make the web publishing process more agile and reliable by providing a better support to the inclusion and updating of content information. So using CMS tools one can concentrate on the content itself and not much on how to publish it (Boiko, 2001).

As it is described in (ContentManager, 2004), a CMS tool allows to create, to edit, to manage and then to publish many different kinds of content by people from a technical staff (in a centralized way) as well as by people from a non-technical staff (in a decentralized way). In any case, the staff can make use of a CMS application with its set of rules, processes and workflows, which guarantees a valid and consistent exhibition of the content on the Web.

The growing quantity of digital content produced by the organizations and the necessity of document sharing in a rapid and easy manner by using the Web are the main driving factors to the emergence of the CMS tools (Bax, 2005). Thus to cope with these factors the Content Management must allow to manage all phases of the Web publishing process, since the creation until the publication of the content.

A CMS tool can be divided in seven layers (Tiwana, 2000): interface, access and authentication, collaborative intelligence and filtering, application

layer, transport, integration, and data repository. The objective of these set of layers is to deal with the main problems of the content management (Bax, 2003):

- different kinds of difficulties that restrain the content production adequated to the Web;
- lack of compromising or involvement by the users due to technical difficulties of publication and use (excluding the motivational aspects, which the content management system can give support with some specific features;
- lack of more elaborated content organization of the information items and their relationships in the form of links;
- different kinds of errors and low quality information;
- inflexible interfaces mixed with the content in a not customizable or not configurable way

One of the current techniques adopted by CMS tools is the decentralization, where the technical staff is not responsible anymore to publish the content related to the business of the company and this activity passed to the staff that directly produce the information (Lapa, 2004).

The present work proposes a content management system oriented to high education institutions. Its

main objective is to optimize the web publishing process in a way that makes easy the dissemination of information directly to the specific kind of public that is part of high education institutions. Most of the existing CMS tools oriented to this same kind of institution (for example, the Moodle tool (Moodle, 2006)) is focused on the learning activities and not in the attractive and efficient dissemination of institutional information.

The paper is organized as follows. The section 2 presents some CMS tools which are focused on high education institutions. In the section 3, the definition of our content management system is described in details. In the section 4 an overview on the development process of our CMS tool is presented, showing the features and use of each part of it. In the section 5, a case study is reported to illustrate the applicability of our approach. The section 6, we give some directions for future work and in the section 7 we present the conclusions of our work.

2 RELATED WORKS

Currently one very popular CMS tool is the Moodle tool (Modular Object-Oriented Dynamic Learning Environment). Its first version appeared in 1999 and since then its main focus is on features to support learning activities. Moodle is modular and open source (Fernandes, 2005). In the Moodle tool the contents are made available in the form of virtual classrooms, where the teacher publishes the content of a course and can use some Moodle features to propose learning tasks to the students. Our approach is completely different of the Moodle focus, since we intend to facilitate the dissemination of information and not to support the learning process.

Another popular CMS tool is TYPO3, which has its development started in 1997 by Kasper Skrhj (TYPO3, 2006). At that time, the CMS term had not been yet created. TYPO3 is also open source and offers flexibility and extensibility for its tools, which have ready-to-use interfaces, functions and modules. But differently of our approach, TYPO3 is oriented to the content of companies in general and not high education institutions (Hinderink, 2005).

Mambo Server is also a very popular CMS tool and has been used to implement many different kinds of websites (Shreves, 2006). Mambo is open source but recently some changes in the licensing terms caused some developers to leave the Mambo team and to start a new project called Joomla. Joomla (Graf, 2006) is a Mambo based content management tool that uses PHP and MySQL as implementation tech-

nologies and has a growing community of developers. Joomla is mainly oriented to a non-technical audience, so it is more focused on personal websites.

3 CONTENT MANAGEMENT SYSTEM

Our content management system is modular, object oriented and can be easily configurable. In the current version, our CMS provides some very useful modules to be used in the development of institutional portals. These initial modules follow the object oriented paradigm and are very well documented, so they may also serve as starting point for the development of new modules.

The figure 1 shows the current modules of our CMS tool.

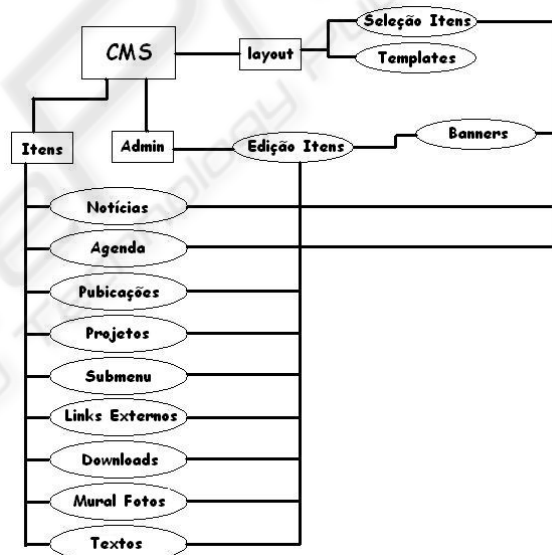


Figure 1: Flow diagram.

In the next sections, the modules presented in the figure 1 are described in details. All the modules are mainly oriented to the content visualization.

3.1 News

The news module is a powerful tool for the management of the institutional news. This module allows the listing of the latest news in the initial web page with headlines and categories. The module provides a rapid access to the news content in a completely structured way, making easy the visualization by the system user. The module also offers a good pagination

mechanism with listings by month and year in order to make easy the searching for a given news. The news module allows to post news dynamically by means of an administrator panel with many resources, where one can delete, alter, and insert news. In order to create and edit news, one has complete control on how to present the edited text by means of all basic resources found in a text editor.

3.2 Agenda

With the agenda module it is possible to publish on the portal the information about all courses, conferences, events, etc., which are available to students, teachers and community in general. The module allows the listing of the events by departments that are offering the event, as well as by month. Thus, the agenda module is useful as a way to disseminate all information about the various activities that are occurring in the institution. The items in the agenda can be shown directly on the main page of the institution, where to the next events to occur will be given more relevance.

3.3 Publications

The publications module allows to organize the contents about materials published by the institution as, for example, published books, scientific magazines, scientific exhibitions, and proceedings of symposia and conferences. Thus all kind of publications are covered by this module in a way that facilitates the access to all this kind of information. The module was developed specially to deal with the visual publication of book covers and download of technical papers and scientific magazines. Thus the module follows all characteristic standards to provide an uniform organization for all this kind of content in a high education institution. The module is entirely customizable, adopting the use of logos to identify functionalities, and presents the covers of the publications on the administrative panel of the module. The module has support to many different image formats, as for example, jpg, gif, and png, which will be automatically processed to a better visualization on the web page. All the content adopts the pdf format as standard, which makes easy the access to the material by the visitors of the portal. The editor user manages the publishing process by means of the creation of editions and/or volumes for a specific magazine, and topics for books that are classified according to the year of publication. The editor user can also schedule the submissions to the created editions, then organize its summaries, and finally publish the edition. A mag-

azine can be published in the pdf format, one file for each edition, monthly (or bi-monthly, or by semester).

3.4 Projects

The module for management of projects offers an interface to create all the different projects associated to the institution. The module allows to create user interfaces to courses, as well as academic guides, teacher manuals, and all this kind of information with a structure focused on access areas.

3.5 External Links

The external links module provides two methods that can be used to exhibit external web pages inside of our CMS. In both methods it is maintained the unity and focus on our CMS pages. Either the external web page is incorporated inside a page at our CMS or the external page is opened by using layers, which are structured with XML-DOM features.

3.6 Downloads

In the downloads module it is possible to list all the available content of a given portal area, including details as file size, number of access to the file, etc.

3.7 Gallery

The gallery module allows organizing listings of photos for portal areas that can use images as content items. These listings include thumbnails in the administrative panel for the available photos, which are automatically generated by the server. The module has support to all common image formats (as for example, jpg, gif, and png) and converts each image for the system standard format, which is the jpg and can perform an analysis that can identify possible distortions in the converted image.

3.8 Texts

The text module is very simple and allows just exhibiting a text that was edited by the user, without any further processing.

3.9 Banners

With the banners module it is possible to create banners and access buttons, which are linked to content available on any of the previous mentioned modules. The banners and access buttons can be placed on the main page of the portal.

4 DEVELOPMENT PROCESS OF THE CONTENT MANAGEMENT SYSTEM

The development of the content management system has followed a formal software engineering process, using the UML notation. The development process will be explained in the following sections.

4.1 Analysis

In the analysis phase it was used UML diagrams to produce a standardized documentation. From the requirements analysis it was identified some aspects as essential: easy and flexible features for content management; user authentication with customizable permissions access control for different kinds of users; agile and easily customizable layout.

The figure 2 shows the use case diagram that was modelled from the requirements analysis.

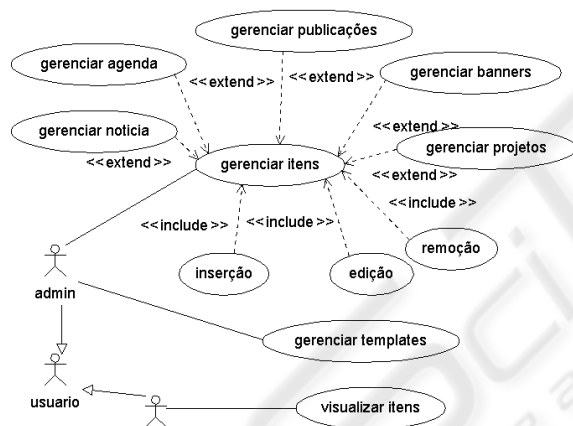


Figure 2: Use case diagram.

Also based on the identified system requirements, it was defined some main concepts for the system, as for example: All individuals that access the portal are defined as "users"; A "guest" is a user that has not been authenticated and so has permissions just to view the public content of the portal; A possible authenticated user is the "admin", which can manage content items of the portal; "Manage content items" functionality includes the "insert", "edit", "delete", and "view" standard operations, which are also present in the "Manage news", "Manage agenda", "Manage publications", "Manage banners", and "Manage projects" functionalities. Thus, the "admin" user has total control of the system, since the "Manage content items" functionality is the basis for all others functionalities.

From these concepts, class diagrams for users and items were modelled. The figure 3 shows the class diagram for "user".

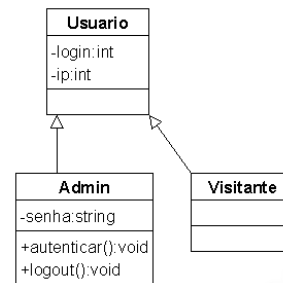


Figure 3: Class diagram for users.

The class diagram for users shows the definition of two kinds of users in the system: "visitante" (guest) and "admin" (administrator). In figure 4 we have the class diagram for items.

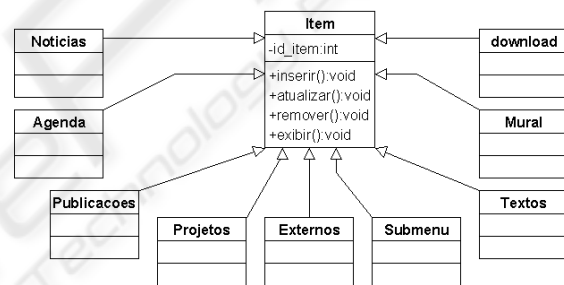


Figure 4: Class diagrams for items.

4.2 Design

Based on the information from the analysis phase, it was decided to structure the system in blocks in a manner that would make easier to integrate new blocks. The main part of the system is shown in the figure 5.

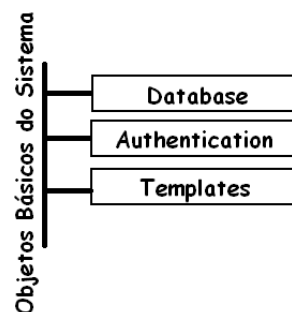


Figure 5: Basic structure of the system objects.

It was also decided to adopt the MVC (Model/View/Controller) design pattern in the design of the system. MVC enforces the separation of the application logic (Model part) from the user interface (View part) and from the application control flow (Controller part). Thus MVC allows that a same business logic be accessed and viewed by means of different kinds of user interfaces (Wikipedia, 2006). In the figure 6, it is shown the different parts of our tool.



Figure 6: MVC Standard.

For a correct implementation, the object structure listed above was adopted. The layers for Model, View, Controller have been implemented in such a manner that the inversion of the order is not possible. For instance, the interface layer (View) depends on the control layer (Controller), which implements the model layer (Model), but the inverse order can not happen. The template design has followed the system module structure. The figure 7 illustrates this template organization.

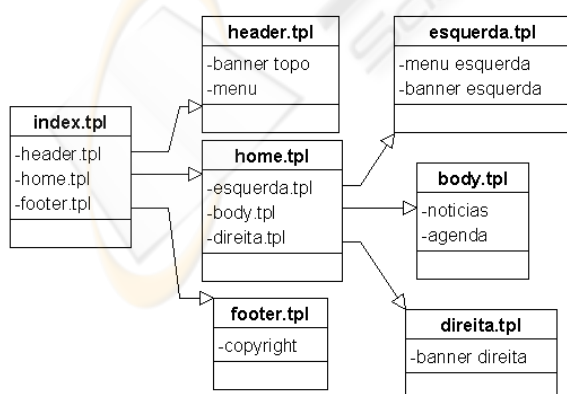


Figure 7: Template design.

4.3 Implementation

Our CMS tool is based on the AJAX and XML-DOM technologies, which can manipulate asynchronously the web requisitions. These technologies contribute to increase the portal performance by updating only parts of the web page, which have changed and so must be updated.

Moreover, it was adopted as programming language, one that is already considered a standard to the implementation of web applications, which is the PHP scripting language web (Adonai, 2004). PHP is open source and facilitates the data manipulation in a flexible and scalable way. In the current version of our CMS tool, we use the PHP 5, which gives support to all concepts of object oriented programming.

The database management system MySQL was chosen to implement the database part of our CMS tool. MySQL is also open source and prioritizes three important aspects: performance, reliability and usability (AB, 2006).

5 CASE STUDY: FACCAT'S PORTAL

The necessity of a better tool to manage the web content of the institutional portal of the Faculdades de Taquara (FACCAT) (FACCAT, 2005), a small university at the Rio Grande do Sul state in South of Brazil, was the starting point to the development of our CMS tool.

5.1 FACCAT's Previous Portal

In the previous FACCAT's institutional portal, the content management was entirely manual, where each updating would imply the manual edition of many html pages. For example, to change the structure of a menu at the main page of the portal, it was necessary to edit all possible affected html pages. In the figure 8 is shown the main web page of the previous portal.

The portal shown in the above figure is implemented by a huge html page, with no possibility of content management and a very difficult and manual customization process.

Due to the great overhead in the maintenance of the html pages, many internal web pages were kept outdated. This situation produced much inconsistent information across the portal, making it entirely unreliable. Since the content management was realized in a per-page process, no standard could be enforced. So it was very common to have many different pages with very similar contents.



Figure 8: FACCAT's previous portal.

5.2 FACCAT's New Portal

The new FACCAT's institutional portal, developed using our CMS tool, has its content managed by the basic modules of our tool, including the news, agenda, and banners modules on its main web page, and using the above mentioned modules in the internal structure of the new portal. The figure 9 shows the main web page of the new institutional portal.



Figure 9: FACCAT's new portal.

As suggested by the above figure compared to the figure 8, the improvements on the portal are related to the increase in the access time and to the new features for the content management.

With the new implementation, the management of institutional publications finally was incorporated to the portal. It was possible to publish all editions of the scientific magazines, books, scientific exhibitions

and proceedings. The inclusion of external content in the portal was also made possible. Thus, the visitors can have access to external contents without losing the focus on the portal. The new implementation of the FACCAT's portal allows the realization of administrative tasks via web by using the basic modules of our CMS tool.

6 FUTURE WORK

The implementation of a webmail module for our CMS tool is one of the planned future works. This will integrate the institutional portal with the electronic mail system of the institution by means of the imap protocol.

An aspect to be investigated is the use of access levels to the administrative area of the CMS tool in order to establish a better distribution of the administrative tasks among the modules.

7 CONCLUSION

This paper presented a CMS tool oriented to high education institutions, which makes easy the web publishing process and facilitates the creation and updating of a communication channel between the institution and its internal (students, teachers and administrative staff) and external (visitors for the portal) community.

Institutional portals developed by using our CMS tool support huge quantity of diary accesses and the provided communication channel provide information on all services offered by the institution, including events, news and notes, as well as academic information for student for example, offered courses, current schedules, etc.

The new institutional portal of the FACCAT, developed using our CMS tool, has improved the dissemination of the news and events related to the academic activities. The members of the staff, which are responsible for the portal, emphasized how easy is to maintain the content of the new portal, the visitors have noted the constant updating of the content and so they come back to the portal more frequently.

REFERENCES

AB, M. (2006). Mysql ab :: Why mysql? URL: <http://www.mysql.com/why-mysql/>.
 Adonai, C. (2004). *PHP & MySQL: Guia Avanado*. Brasport.

- Bax, F. S. P. M. P. (2003). *GESTO DE CON-
TEDO COM SOFTWARES LIVRES*. URL:
<http://www.netic.com.br/docs/publicacoes/pub0004.pdf>.
- Bax, F. S. P. M. P. (2005). Gerao de sistemas de gesto de
contedo com softwares livres. *CLEI'05 - Conferncia
Latino-Americana de Informtica*.
- Boiko, B. (2001). *Content Management Bible*. Wiley.
- ContentManager (2004). *What is a Con-
tent Management System*. URL:
<http://www.contentmanager.eu.com/history.htm>.
- FACCAT (2005). Faccat - faculdades de taquara. URL:
<http://www.faccat.br/>.
- Fernandes, P. L. J. P. J. (2005). O moodle e as
comunidades virtuais de aprendizagem. URL:
<http://www.dct.fct.unl.pt/PLegoinha/CNGMood.pdf>.
- Graf, H. (2006). *Building Websites with Joomla!* Packt.
- Hinderink, W. A. R. F. D. (2005). *TYPO3 Enterprise Con-
tent Management*. packt.
- Lapa, E. (2004). *Gesto de contedo*. Brasport.
- Moodle (2006). O moodle e as comunidades virtuais de
aprendizagem. URL: <http://moodle.org/>.
- Shreves, R. (2006). *Mambo: Your visual blueprint for build-
ing and maintaining Web sites with the Mambo Open
Source CMS*. Visual.
- Tiwana, A. (2000). The knowledge management toolkit:
Practical techniques for building a knowledge man-
agement system. *Prentice Hall*.
- TYPO3 (2006). The history of typo3. URL:
<http://typo3.com/History.1268.0.html>.
- Wikipedia (2006). Mvc. URL:
<http://pt.wikipedia.org/wiki/MVC>.

