

UNIVERSAL WCMS

An Open Source Web Content Management System and Customer Relationship Management for e-Business

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Abstract: Web technologies bring to the companies the opportunity to show their products and services around the world, increasing the number of potential customers. Furthermore, the evolution of these technologies in the last few years has allowed the development of Web applications to access private customer data from anywhere at any time, it is an important improvement to customers. This paper proposes an Open Source tool to create and manage a Corporate Management web Site (CMS), and to provide Customer Relationship Management (CRM) Web application without requirements of Web programming knowledge. Universal Web Content Management System accomplishes wide range of small and medium-sized businesses requirements, through high customization capability and low implementation cost.

1 INTRODUCTION

Nowadays, Web sites are a very important business feature. The standard methods to interact and update do not allow the development requirements, though the new methods to create and deploy web sites are becoming easier to use. It is often necessary special web functionalities within corporate web site.

The Open Source community has provided some tools that allow users, without large knowledges of programming language and markup language (such as HTML), creating and managing content with relative ease of use. These tools are known as WCMS (Web Content Management System) (Cuerda, 2006). The Open Source model increase popularity in WCMS tools. For example, Joomla!, Drupal, or Plone (Wersin, 2001) (Boiko, 2004) are WCMS tools.

Universal WCMS provide us a flexible and extensible tool that allow us to create and manage the contents of a real estate agency Web site. This Web site also can provide a private access that could act as a CRM tool. Our goal is a framework to create and manage customized database fields and

associated forms to edit them. In the other hand, the tool should also be user-friendly and configurable. And, last but not least, be available as Open Source, preferably under the GNU general public license, with active support and development.

Available tools, such as Content Creation Kit (Chaffer, n.d.), Table Manager (IW1QLH, n.d.), Database Query (Green Mountain, n.d.), do not fulfill all of our requirements, though each of them certainly surpassed them in at least one (Robertson, 2002). The first version of our framework has finished in December 2006. A last version of our framework *Universal WCMS* are available for public download from <http://uwcms.sourceforge.net>.

2 UNIVERSAL WCMS OVERVIEW

Universal WCMS joins the benefits of one of the most popular Web Content Management System, Joomla!, with a self-developed database management extension (a.k.a. Joomla! Component). This extension provides Joomla! the ability to

manage and create customized fields and tables in a MySQL database without using SQL sentences or database management knowledge.

2.1 Joomla! Components

The basis of Joomla!, is the *Component*. It is a major part of the overall functionality of the WCMS. Generally, a Component is an application or a process, that enables content or information that can be created and controlled. A component is sited on top of Joomla!’s scheme, but integrates closely with the Joomla! framework itself (Graf, 2006).

Our database management tool has been developed as a Joomla! Component extending its core functionality as it can be seen in Figure 1.

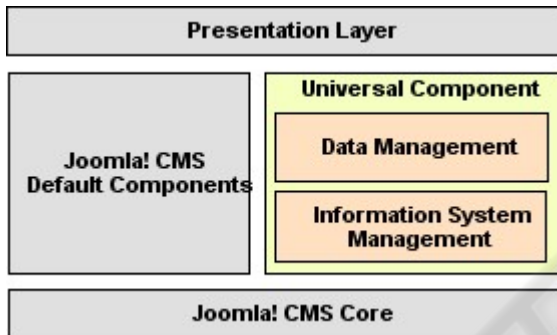


Figure 1: Universal WCMS structure.

Universal Component consists of two sub-components: **Information System Management** and **Data Management**, which will be introduced in Section 3.

2.2 Universal Component

Our goal is to achieve a universal application that fits the requirements of a wide range of small and medium-sized business. Therefore, we propose a highly configurable component, where almost all the details could be customized according to the company requirements (Olsina, 1995) (Wokeu, 1996).

The single elements that act as basic blocks of the Information System are known as *Entities*. Entities are defined by a univocal name and several characteristics. One example, among these characteristics, is the requirements of attaching images or files to the entities.

Entities can interact with the system. This is necessary to provide additional information as an email address and a password. After the entity is authenticated by the system, it is allowed to read or

read/write the requested information depending on its access level.

On the other hand, it is possible to create and manage attributes (database fields) in order to provide semantic meaning to the entities. Each of these attributes belongs to a particular formatted data type (text, date, currency...). The definition of multiple attribute types makes possible their appropriate validation and formatting.

Each entity is basically a data warehouse to store records as a telephone directory. It is possible to make links between entities in order to implement composition or aggregation. The links have two characteristics which defines them: direction and cardinality. The first one states if the navigability is unidirectional or bidirectional, also indicates which entity is master and which entity is slave. The second one declares the number of records from the slave entity that can be linked to by the master entity.

As entities, links can also contain extra information by adding some data fields that complete their semantic meaning. This information does not belong to any entity that forms the link, but it belongs to the own link. This resource is used when the information has only sense by connecting two records. Field management is the same in both cases.

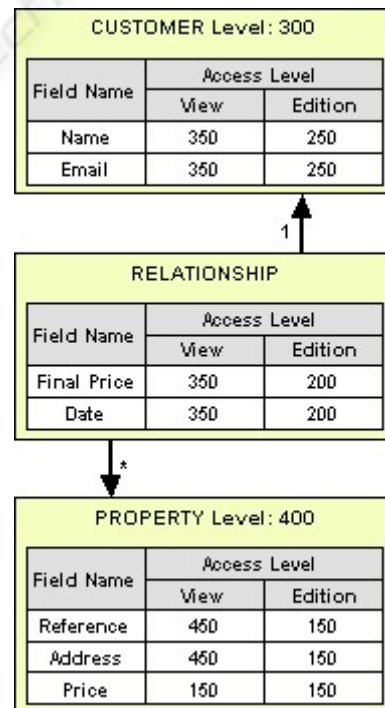


Figure 2: Example of relationship.

Promoción 1

Location: Dirección 1, Localidad 1 (Provincia 1), ESPAÑA

Features: Campo de golf , Helipuerto , Pista de tenis.

Reference	Type	New	Bedrooms	Bathrooms	Plot Area (SQM)	House Area (SQM)	City	Sold
PROM1B	Chalet	Yes	4	2	500	200	Localidad 1	No
PROM1A	Bungalow	Yes	2	1	100	70	Localidad 1	No

Figure 3: Customer view. List of properties.

Despite that two entities are linked, it could be necessary to limit the access to some of its fields. In order to solve this problem, each entity has an access level that is checked before doing an action. On the other hand, each field has a numeric access/edit level. The union of both mechanisms forms a numeric-based access system.

In Figure 2, it is shown an example where there is an entity, “CUSTOMER”, linked to another one, called “PROPERTY”. Due to CUSTOMER’s level is 300, it only is allowed to view reference and address from properties, but not price. That is because price will be negotiated by the salesman, so price is assigned in the information link. Final price in the link information is visible by the customer but not editable, just as property information.

Cardinality, shown next to arrows in Figure 2, means that one customer can be linked to lots of properties, while one property only can be linked to one customer.

3 DESIGN

Application is composed by two separated parts. Firstly, there is an administration section where lies the information system management, entities, fields and links configuration. The second one consists in data management over previously created information system by administrator users.

3.1 Information System Management

Each entity corresponds to one table in the system database in order to logically separate data from

each entity, therefore performance will be highly increased. In this way, tables’ records are entity instances. For example, “Clients” entity has got a “Clients” table where all the clients’ records will be stored.

Moreover, field management contributes to fill entity tables with columns or fields, because empty tables are just empty containers where it is not possible input any information. Those fields have got several possible data types to belong to and they match database own types. Every type matches a regular expression that is called to validate input data from users. That is very useful in order to avoid users introducing malicious information that might cause some system malfunction. Furthermore, maximum and minimum length can be configured in almost every data types.

Links are configured by selecting a master and slave entity. Both entities can be the same, in which case, it would be linked to itself. We must also specify cardinality (one to one or one to many) and exclusivity (one slave record can be linked by another master record). As well as entities, each link creates a table in the database in order to store link instances.

Link fields have a similar behavior than entity fields, but fields are added as columns in link table. This way, every pair of records can store information about them. Information System Management is an independent section in order to avoid that all users have permissions to modify the company Information System.

Home Site Menu Content Components Modules Mambots Installers Messages System 0 1 Logout: admin

InmoCMS / com_universal / verGestion Delete Edit New

Data Management: Property Filter Order Please, select an entity

#	Reference	Type	New	Bedrooms	Bathrooms	Plot Area (SQM)	House Area (SQM)
1	PROM1A	Bungalow	Yes	2	1	100	70
2	PROM1B	Chalet	Yes	4	2	500	200
3	PROM2A	Maisonette	Yes	4	1		120

<< First < Previous 1 Next > Last >>

Ver # 10 Results 1 - 3 of 3

Figure 4: Administrator view. Property Management.

3.2 Data Management

Data Management implements the tools to administrate all the information stored in the Information System. The main management data options about selected entity are: **Look up**, **New/Edit Record**, and **Delete Record**. Form is divided in a required tab, **Details** and four optional tabs that depend on entity configuration: **User Info**, **Image**, **Files**, and **Links**.

4 APPLICATIONS

Universal WCMS provides a complete solution that joins Web site implementation with CMS and a CRM application, and can be accessed via Web from anywhere at any time. The system can be configured to store and display any kind of product (properties, books, language courses...).

A real company already use Universal WCMS. Their customer should be able to access to a private area where they could read personalized comments, see private information about their properties: final price, drafts... (Figure 3 and Figure 4), and modify their contact information: name, telephone number, email...

5 CONCLUSIONS

Universal WCMS is a flexible and highly customizable tool. Wide range of companies can use it to implement their Web sites and CRM's in an easy manner. Furthermore, they will be able to provide a private access to their customers and offer them personalised information.

Universal WCMS is open source itself and built using other freely available open source projects. It is freely distributed and we encourage private companies to test it and compose their personalized site without complex tasks and high costs.

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