

DEV WEB MANAGEMENT SYSTEM

Ondrej MARTINSKY

Department of Information Systems, Faculty of Information Technology
Brno University of Technology

E-mail: martinsky AT users.sf.net

ABSTRACT

The theme of my work is the technology of dynamically generated websites and interactive web applications development. I have developed my own generic software solution – system for content management of web portals – “DEV web management system”. My objective was to develop a CMS system allowing website administrators to manage big amount of informations easily and quickly. System is licensed under the terms of GNU/GPL license agreement. I decided to build DEV on php and MySQL technologies, standard for the open-source platform. System is used on hundred of sites all over the world, and it was translated into eleven languages. DEV web management system (as an open source project) is hosted by the Sourceforge.net software foundation.

1. INTRODUCTION

The theme of my work is the technology of dynamically generated websites, interactive web applications development and implementation. In my work, I describes my software solution – system for content management of web portals - named „DEV web management system“.

At first, I would like to introduce you to the history of DEV web management system development. Less than 1½ year before, I started to developing an information system for requirements of intelligence web portal. Developer.sk My objective was to create a system allowing me to manage big amount of technical informations easily and quickly. System was licensed under the terms of GNU/GPL license agreement. I decided to build DEV on php + MySQL technologies, standard for open-source platform.

In later phase of system development, I enriched DEV by many of new functions. So, the development reached the new meaning. I decided turn DEV into a universal and very flexible content management system for utilization on many of websites all over the world. My objective was to build a high utilizable and powerful software solution competing to the world most popular CMS systems. (See DEV in top-rated listing at www.sf.net)

The core of system is based on open – source software solution free downloadable from internet. System is translated into several languages (English, Spanish, French, Italian, Slovak, Czech, Bulgarian, particularly Deutsch.) Now, I am negotiating translation into Russian.

Now, I am about improving the system and documentation. The main objective of documentation is to provide basic know-how in process of customizing to the client programmers. Open – source software is a basic assumption for a customizing by editing source codes.

2. WORK METHODICS

I would point out that the development of interactive applications (systems for content management for example) is very different to development of simple web pages. Creating simple pages is related only with one technology of html markup language. On the other hand we must apply wide range of various technologies in development of CMS systems. (Like server and client scripts, applets or database subsystem)

The algorithmization in interpreted scripts brings many of new at first sight invisible problems – so-called bug. These deceitful errors appears only after some time in connection with application use. The bugs rises from structure of algorithms, so it's important to put sufficient time and energy to planning the strong and mistake-free structures.

Sometimes, start from scratch is better than neverending correcting the wrong designed system. So, it is normal that software development takes long time after first version release.

I have utilized my knowledge and experiences of building interactive web applications during the development of DEV. Because DEV (like other similar CMS systems) is just a group of interpreted scripts, you will need arbitrary text or php editor for editing them. You shouldn't use WYSIWYG (What you see is what you get) type of editor, because it's usable only for creating design, not for editing functional properties of system. The development of DEV was realized on Mandrake Linux 8.2 platform. I have used Apache 1.3.22 as web server, php 4.1.1 as script interpreter and MySQL 3.23 as database subsystem.

Because DEV web management system is platform independent, it will run also on different system as well as on Linux + apache + MySQL.

3. DEV WEB MANAGEMENT SYSTEM

DEV web management system come under the family of systems for content management, also called CMS systems. DEV is an open-source CMS system based on PHP and MySQL technology licensed under the terms of GNU/GPL license agreement. The main objective of the DEV is to simplify and make easier the management of huge amount of informations on large intelligence web portals. For continuous growth of these pages, which are often built by dozen of redactors is necessary to create a user friendly interface, that allows redactors to adding entries written e.g. in MS Word.

DEV supports all these facilities and brings many of additional modules that make your pages into a modern web portal. DEV allows you to organize your articles into the zones and sections, comment, evaluate, edit or export them into a XML format. For management your multimedia content, DEV contains module called „Multimedia Gallery“. Of course, DEV allows you to administrate advertisement canvasses, user's accounts or discussion boards on your website.

DEV web management system allows you to change design of your website by special user-friendly tool DEV design customizer without editing any html or css sources. You are able to create various design schemes using this tool and share it with others via internet.

SYSTEM REQUIREMENTS AND INSTALLATION

DEV web management system requires server with network services connected to the internet or area network. Because DEV is platform independent, you can use MS Windows as well as Linux. You will need web server Apache (or IIS on Windows platform), hypertext preprocessor PHP 3.0 or higher and MySQL server 3.23 or higher. On the client-side you will need arbitrary web-browser in compliance with HTML 4.0 and JavaScript.

The authentication mechanism and sessions management is very flexible. Except cookies, it supports alternative ways to transfer session ID between client and server, because cookies can be blocked out for security reasons.

The system installation consists of two steps. The first step is to copy all files from installation package into a web-root folder. The second step of installation is realized via web interface. You can run installation wizard by entering URL address in form of <http://www.yoursite.com/install/>. Installation wizard automatically realizes system check and detect server's configuration. Wizard will prompt you for database access and short characteristics of your future site. During installation, you can choose one of the language files (English, Spanish, French, Slovak and Czech available). Language files define text outputs on all pages. Also, within the process of customizing, you can create own file. Language files can be fluently switched in DEV control panel. Your website will have standard settings and design shortly after installation.

ADMINISTRATION AND CONFIGURATION

One of the CMS system's properties is a strict separation of informations and functional content of websites. In many cases, design is based on principle of html and css templates. These templates can contain insertions of the program code. In many cases, editing these templates is too difficult and complicated.

The DEV web management system brings the new possibilities of editing graphical appearance by integrated design editor available in the DEV control panel. This editor contains tools for mixing colors or tools for selecting the suitable font types (as you know from MS Word).

All settings, including the design and appearance schemes can be exported into the configuration files for purposes of back-up or sharing.

Beyond the tools for creating design schemes, DEV contains many of the functional settings (sessions, managing advertisement, zones, sections, setting-up the notify functions and logging, managing security and IP addresses, etc...)

User administration

There are four different types of user's rights in DEV. The first level of rights is assigned to visitors. Their rights are fairly restricted to adding entries into discussion boards or to commenting articles. The second level of the rights is assigned to normal registered users. Registered users can add new articles or news into queue of waiting stories. Superusers have a third level of user's rights. It comes to this, that their activity isn't conditioned by administrator's check. The last level of rights is the administrator's rights. Administrator has an allowance to manipulation with all data in system. The rights of respective groups can be fluently modified according to the administrator's requirements.

Article administration

Under the term „story“ we understand whatsoever block of text, like article, news, poll or comment. All stories can be modified or deleted according to type of user's account. All text data can be exported into Microsoft Excel or OpenOffice XLS files, or into XML (Extended markup language) format.

Extended functions

The subject of all content management systems is to automatize and simplify administration of more informations (stories, articles, comments, entries, photo galleries, etc...). There is emphasis to easy to use for all users without technical knowledge. DEV web management system meets all these requirements like a full text searching or access right management, etc ... DEV can accept data in html or txt format. For comfortable article addition, DEV contains something as simple html editor, which allows you to enter informations in html format.

Modules

Except standard functions for content management, DEV brings many of extended tools and possibilities in add-in modules.

Advertisement

Manage billboards on your site by „advertisement“ module. This module allows you to allocate one billboard on your page by several advertising banners. Banners will be exchanged on the site according to the exchange rate, you have set. Also, you can join banners with specific sections of your site.

Download Manager

Download manager is special module, that provides download services for your files. You can easy publish files of arbitrary type using this module. Module provides statistics and download counters for each file separately. Each file assigned to download can be separately commented. Of course, file sizes are automatically converted to their convenient multiplicands (kB, MB, GB) according to file size amount.

Photo gallery

You are able to publish your multimedia files like photos, pictures or videos quickly and easily using the Gallery module. This module supports creating thumbnails of your files. You can organize and categorize your multimedia stuff in the sections. System can automatically scan selected directory with all subdirectories and add all multimedia content into the gallery.

Notification

This module provides an e-mail communication. You (as reader) can send articles to your friend via e-mail. Webmaster can be informed about the site status via notification mails. E-mail gateway is also included. All outgoing mail can be logged for case of misapplication. This module contains wide range of the notification settings.

Discussions and boards

System supports unlimited number of discussion boards. Top listing of these boards can be placed into the special panel on all pages. All boards can be administrated and moderated using the DEV control panel.

Polls

Taking polls is standard for many of web portals. DEV allows you to create polls via control panel. New poll will be displayed on reselected space in „panel“ form. If you don't want to take poll, you can see results of older polls.

Lists and statistics

DEV supports making various listings of top-rated articles and most-active authors. Except previous modules DEV contains many of others, like module for static articles administration or module for publishing news.

Manual & Documentation

The documentation guide is standard component of the DEV. Guide is situated in individual frame on the right side of the control panel. During your work in control panel, guide always points to the activity, you are performing. User is exempt from never-ending browsing and seeking in guides. All informations are always at elbow.

You can download the complete documentation project, which contains administrator's and developer's practices. Commented parts of source codes are also included. (Together in amount of cca 200 pages) <http://dev-wms.sf.net/soc.pdf>

3.1 DEV FROM USER'S POINT OF VIEW

From user's point of view, DEV seems as normal dynamically generated webpage. The main objective of the DEV is to simplify administrator's and developer's work – creating huge and interactive websites with database connection. The visitors of the page are not interested in management mechanisms. The main objective is to show him nice, modern and attractive dynamically generated page with many of interesting and comprehendious informations. It is important to create conditions for interactive communication between visitors and website. You can proceed this by placing boards, polls and comments on your pages.

You can see on the picture below the page generated by DEV using the standard design. Screenshot demonstrates example of internet portal, normally known from internet.

You can see the main functions of article-annotations page on picture below. Each article can be sent via e-mail. You can create a printer-friendly versions of articles. Each article has a separated access-counter, so you can regard readability of individual articles. Separated poll and discussion board allows readers to comment and evaluate each article individually.

Also, article has a separate poll and discussion boards (comments).

3.2 DEV FROM ADMINISTRATOR'S POINT OF VIEW

All administrator's tools are concentriced in DEV control panel (Administration console). DEV control panel is universal set of tools for routine site administration – administration of stories, articles, users, sections, advertisement or multimedia content, etc ...

DEV control panel is based for web – browser enviroment. That's basic assumption for remote administration of site. Webmaster can log into control panel by entering url

address in web browser. In „remote administration“ case, url address of control panel will be in http://name_of_site/admin/ form. If you administrates system locally, you reach control panel by entering <http://localhost/admin/>

At first, you should log into system as administrator using password you provided during installation process.

You can change many of properties in control panel. You can access to groups of settings by cascade menu. Control panel contains three types of tools:

- **Routine administration**
Here you can access tools for routine administration. Under this term, we understand administration of articles, news or users. Statistical functions allows you to proceed visit-rate analysis. For example, you can create a graphical statistics of visit rate. You can maintain polls, discussion boards, comments or advertising banners. Also, you can restrict undesirable IP addresses. This group contains tools for direct access to sql database.
- **Functions for system configuration**
This group of tools is instrumental to set functional properties of your site. Here you can modify general settings of your site, personal settings of administrator's account or e-mail notification settings. "Security and sessions" options are also included. In this group of security options, you can choose between compatibility and safety of your system. Each module has a separated group of settings in "Add-in modules" submenu. Of course, all setting can be exported for back-up or sharing purposes.
- **Design customizer tool**
DEV w.m.s. allows you to change design using special user-friendly tool (contained in control panel) without editing html code! Using this tool, you are able to create various design schemes and share it with your friends. Also, if you don't want to use design customizer, there is way to create design manually by editing html and css

3.2.1 STRUCTURE OF GENERATED PAGES

It is necessary to know the basic structure of generated html documents (documents of your future webpage) for orientation in the system. In this topic, I will explain you some basic terms and expressions describing individual elements on the pages. Understanding these terms are necessary to proceed operations in the DEV control panel. Regard only the visible structure of document. Don't speculate about the javascripts or metainformations.

Structure of generated documents are primarily designed for using on intelligence and reporting webportals, that periodically publish informations in form of articles or stories. These articles can contains images or other multimedia content. The standard of many of CMS systems are generating pages clustered from tables. DEV web management system answers all these standards. Of course, you can reach almost arbitrary structure of generated elements and pages by editing their html and css sources. There is only one limitation – the properties of html language.

Visible content of generated pages is formatted by set of HTML tags. These tag are in nested structure of <body></body> tag. Pages generated by DEV web management system can contains structured elements of „column“, „bar“, „annotation“, „panel“ class. These elements represents structures created using html tables in HTML point of view.

You can see the basic layout of pages generated in short time after installation according to standard scheme. Particular components are schematically described on picture below.

3.2.2 DEV DESIGN CUSTOMIZER

DEV contains special tools, that allows you to create design and appearance of your website easily without modification of html or php sources. The tool's name is „DEV design customizer“. Design customizer is standard component of DEV control panel. The custom design can be created and updated remotely from any computer connected to the internet without any additional software. You can proceed reconstruction of your site in real time. Your website's functionality will not be limited by your activity.

Of course, Design customizer has a some limitations, that results from its character, because this tool is based on www platform. This tool contains many of settings, that allows you to change site geometry, images, backgrounds, css classes, etc ...

The main philosophy is to generate html code following the many of system variables, that contains the whole site appearance. This tool is designed for changing appearance – not functionality, so if you want to proceed in-depth functionality customizing, you have to do this by editing php sources. Also, if you don't want to use Design customizer, there is way to customize design manually by editing html and css patterns. To comfortable use of Design customizer, there is necessary to understand the basic structure and terminology of pages powered by DEV.

DEV design customizer contains many of settings, that are grouped into several basic groups:

- „Basic look“ settings
Here you can set the basic geometry and layout of your website, dimensions, basic colors or surface textures.

- Basic fonts
DEV design customizer contains intuitive tools for font selection (described in „DEV from administrator’s point of view). Setting up the basic classes of fonts allows you to create dynamically generated cascade styles.
- Hypertext anchors
The second generation of cascading style sheets brings new possibilities of defining css classes for hypertext anchors. DEV design customizer follows this new trends, so you are able to create the various styles for hypertext anchors.
- „Structure and page components“ settings
This option provides many settings of page particles. You can change there appearance of bars, tables, columns, bars etc...
- Annotations
The looks of annotation can change appearance of your web. Design customizer provides wide spectrum of annotation’s appearance settings, like icon placement or font type selection.
- „Components appearance“ settings
DEV contains advanced tools, like tool for building „html code“ documents or tool, that transform your documents into a „printer friendly“ version. You can change looks of these components by „design customizer“.
- „Forms, input fields and scrollbars“ settings
You can change in this section looks of some page components, like scrollbars, forms or buttons.

Following pages was created by their respective owners using the DEV design customizer. Design customizer is standard component of DEV web management system. Using this tool, you are able to create pages like these without editing any php, html or css sources

3.3 DEV FROM DEVELOPER’S POINT OF VIEW

DEV web management system is based on principle of php scripts. Php scripts are servlets interpreted by the php preprocessor on server-side. For keep convenience and straightness in your scripts, there are necessary to observe some principles of scripts modification. Each script contains a self-describing header, that contains some informations, like date of last update or script version number.

DEV web management system stores all data into a relational database. Scripts, that operates with this database are stored with html code in web-root folder, so they are reachable by the http server. Client communicates only with one main script. The other

scripts contains only functions, class definitions and other program code. I think, this model i've designed is very simple and maintainable.

For trouble-free running of DEV, you will need MySQL installed on your server. The database name and access informations, you enter during installation process should match with real state of your MySQL server.

You can put the question „*What will happen, if i call from my browser instead of main script one of the other scripts. Can I break the system security in this way? It seems to be a security bug ...*“ I replied „NO“, because of this:

The special object controls, if this script is called directly from web browser, or if script is included by main script. This object „\$access“ is initialized on the begin of main script. The application scripts controls this by simple directive below.

```
$access->granted ? 1 : die ("Access denied");
```

If object \$access doesn't contains the member variable granted set to true, or object is not defined, the proceeding script ends at the first line on this directive. So, there isn't way to call application scripts directly from web browser. Also, scripts called without main script doesn't contain valid identification number of database connection. So, they doesn't have effect to website content stored in database.

Scripts are placed in several folders, from where they are called by main script. According to functional point of view, we are dividing them into groups of Authentication scripts, Scripts for page generating and rendering, Installation scripts and Scripts for administration support.

DEV web management system is based on principle of modules. As „Modul“ we understand arbitrary package of tools, functions or properties that brings new additional possibilities into the system. In this way, client programmers can add new features into the DEV quickly and easily. As I said thereinbefore, this model of structure is very maintainable.

3.3.1 AUTHENTICATION AND AUTHORIZATION MECHANISMS OF DEV

The authentication and authorization mechanisms of DEV web management system are based on the cookies technology and one-way cryptographic algorithms. Client communicates only with one script – index.php. This „main“ script includes the application scripts according to executed operation. The output of these scripts are formatted into a html form according to the settings in control panel. Some algorithms running under the main scripts requires client's authentication.

Because PHP is object-oriented programming language, all authentication mechanisms are concentriced into one object – „\$certificate“. This objects contains a memory space, that saves structured informations about logged user and user's rights.

Process of authentication

Process of authentication consist of login and password verification. Authentication mechanism of DEV is based on so-called „Unix authentication model“ used by many of information systems.

These systems are based on one-way hash algorithms like MD4, MD5 or RSA.

All passwords are not stored in internal infrastructure of system. Only their encrypted forms are stored in databases. Encrypted form is 128 bit number (also called as CRC string) generated using hash algorithm.

Absence of backward string decryption by these alghorithms is mathematically proved, because there is implication and elementary counts.

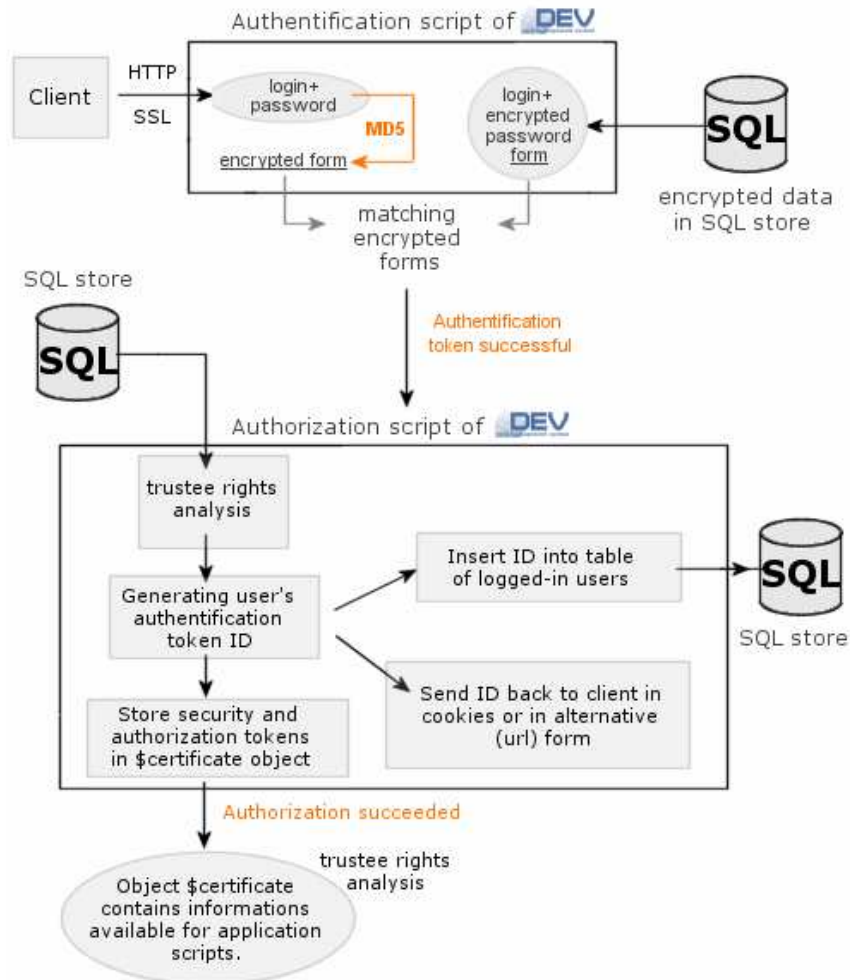
In authentication process, entered password is encrypted by one-way MD5 alghorithm. Afterwards, encrypted form is compared by pasword in database. If encrypted strings matches, process of authentication is successful.

Process of authorization

Authorization is process of granting user's rights, that directly follows the process of authentication. Authorization in DEV is realized using object named „\$certificate“, that stores informations about logged user and user's rights. Each organization unit of DEV can determinate if user's has rights for selected operation.

Authentication and authorization process of DEV is performed by these steps:

1. User send his authentication informations (login + password) via http protocol, or via SSL in encrypted form to server.
2. Authentication script locates entered login in database. If login/username is valid, system encrypt entered password by MD5. MD5 is one-way hash algorithms, so encrypted form cannot be decrypted back.
3. Encrypted form of entered password is compared by encrypted form in database. If both forms are mathing, user's identity is valid and authentication process is successful.
4. The authentication if always followed by a authorization. The authorization is process of granting user's rights. System reads rights assigned to user from database. System stores these rights into a global object \$certificate. This object provides informations about user's rights to the application scripts of DEV.
5. Authorization script generates identification number of logged user (also known as „Session ID“). All user's HTTP requests will be identificated using this ID.
6. System inserts session ID generated in previous step into SQL table. This table contains list of logged users with their corresponding IDs.
7. System send session ID in „cookies“ form (or in alternative form using URL address) to client. Logged-on user will send this ID with every next request.



5. SUMMARY

There are many of similar systems for content management as my software (DEV web management system). The common problem of all these systems is the process of customizing and application for client website's needs.

Ob this, I have developed intuitive and easy tool for creating various designs over web interface – design customizer. The websites powered by DEV are proving effectiveness of this tool in praxis.

Because I am author, my objective isn't to appreciate and evaluate this software. Any assertions for or against this system are misleading from my point of view. It's user's objective to evaluate my work (see „Said about DEV“ topic on software homepage) I don't want to develop system, that will be „the best all over the world“ – it doesn't seem to be executable now. My objective is to bring something new and different to the „family of CMS systems“. System was translated into several languages (English, French, Italian, Spanish, Slovak, Czech, particularly Deutsch). I hope, my software will be successful in this way.

If you want to know more about my project, or if you are interested in my software solution visit the homepage of DEV web management system at <http://dev-wms.sf.net> (fig.12). You can download from this page whole documentation project of system. The latest version of DEV can be downloaded from this page, or from arbitrary mirror of OSDN network.