Discussion on the Functional Requirements of the Website Group System in Colleges and Universities

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Keywords: Website, Website construction, Website group system, CMS.

Abstract. The website group system, which has the benefit of fast construction speed, high security, manageability, mass production, accessibility maintenance, etc., is generally considered the preferred way to construct the websites in colleges and universities nowadays. The construction of website based on the website group system allows each sub website to use the same server-side applications and all the data to be stored in the same data library, that is conducive to information search and sharing, and to avoid the formation of information islands. Because the paying website group system is developed and maintained by professional software companies, it provides a reliable guarantee for the safe and stable operation of the website group system. This study focuses on the website group system and discusses its functional requirements in colleges and universities.

Introduction

Website is one of the indispensable ways of information display, business management and e-commerce, which is the most important application form of the Internet. Colleges and universities, as the focus of scientific research and personnel training, have been actively conducted websites for information display and educational affairs. Almost all colleges and universities have built their own Portals and the secondary institution websites. There are some common problems in building websites from scratch: (1) low-quality of the websites; (2) plenty of loopholes and poor security of the system code; (3) low-speed of the construction; (4) weak management backstage function of the secondary institution websites administrator; (5) imperfection of the authorizing mechanism; (6) difficult to share information between the substations. The SiteFactory and webPlus3 website group systems are suggested to be the good choice based on the investigations of numerous website group systems, due to the mature technology and the reasonable structure. The following sections focus on the above two website group systems and discuss the functional requirements in colleges and universities.

Core Function of the Website Group System in Colleges and Universities

The reason why the intramural websites of colleges and universities are mainly based on the website group system is because their following characteristics in the construction and management. First, the websites of colleges and universities are used for exhibition and their functions are similar. Second, the number of construction sites is relatively large. Besides of the Portals and the secondary institution websites, there are also irregular construction of thematic websites. Third, most of the administrators do not know well in the professional HTML knowledge. Forth, some websites need to be rapidly delivered and put into use, such as some thematic websites, courses and supporting websites.

To meet the demand of colleges and universities, the core functions of the website group system are suggested as follow. (1) It should provide a building mechanism for adapting multiple terminals. (2) It should provide a rapid, safe and flexible website building mechanism. (3) It should provide powerful functions of publishing, modifying and managing articles. (4) It should provide a strong security mechanism and is not easy to be attacked by hackers. (5) It should provide authority allocation mechanism based on login users. (6) It should provide domain name and path based access.
mechanism. (7) It should provide a static web page pre-generation function. The following section addresses each of the core functions of the website group system in colleges and universities.

**Multiple Terminals Adapting Mechanism**

The 41th Statistical Report on Internet Development in China \(^{[1]}\) pointed out that: Up to the third quarter of 2017, the Fiber To The Home (FTTH/0) ports reached 630 million. The basic telecommunications enterprises continued to accelerate the construction of mobile network infrastructure. For example, the total number of 3G/4G base stations reached 4.471 million, accounting for 74.0 %, and the coverage and service capacity of mobile network continued to be improved. 5G network is expected to be commercially available in 2019. The weighted average download speeds for fixed broadband users was 16.4 Mbit/s, and for mobile broadband users accessing the Internet via 4G network it was 15.4 Mbit/s. The broadband subscribers accessing the Internet at a speed of 20Mbps or above accounted for 91.2% of the total broadband subscribers. Mobile broadband Internet can now basically cover cities and counties uninterruptedly and cover some relatively developed areas in towns and villages. As of the end of 2017, the number of mobile Internet users in China reached 753 million, which accounted for 97.5% of the total netizen population. This study investigates most of the undergraduate colleges and a part of the higher vocational colleges websites. In order to adapt the diversification of user terminals, A fairly large part of colleges and universities have built the multi-terminal adapting Web system. The investigation suggests that the multi-terminal adapting Web system mainly has three schemes of construction.

Scheme one is the mainstream currently, which is to construct different versions of website for PC and mobile devices, respectively, with separate layouts and different domain name (or path). The additional website of mobile devises does not affect the running PC version website. The main domain name is generally linked to the PC version. And if the access request is detected coming from mobile devices, then the Server directs the request to the domain (or path) of the mobile version website. Scheme two is to design the Server responsive website, which could be accessed from different devices via the same domain name. The principle of the Server responsive website is, the Server generates a timely HTML code matching the characteristics of user’s device after receiving the access request and sends it back to the client. Thus, each access request is personalized, the separate HTML code for the individual devices is sent to the user’s browser. Scheme three also could be accessed via the same domain name, which is to set up the client-side responsive website. The client sends back exactly identical HTML code to the client after receiving the requests. However, the CSS typesetting and JavaScript programmed instructions included in the HTML code allow the client-side browser to set up the individual display layout and response manner according to the characteristic of devices. This scheme basically relies on the Media Query function of CSS3 assisting with the JavaScript programming.

At this stage, scheme one and scheme two are still the main construction ways for the multi-terminal adapting website. That is because a considerable number of users in China are still using low version IE browsers, which show poor compatibility. Based on website group system, adopting scheme one or scheme two, the website group system needs to provide infrastructure support. In scheme one, each article has two valid URL links, which is not friendly. Thus, scheme two is preferred. However, according to the technical development trend, if the browser compatibility problem is solved, the scheme three would be the best choice for building a display site in the future.

**Rapid, Safe and Flexible Website Construction Mechanism**

Website group system is software system used to construct exhibition websites. It is not generally used to construct websites with complex foreground and background interactive functions. Providing rapid, safe and flexible website building mechanism is supposed to be the basic function of website group system.

**Powerful and Flexible Label or Component.** The website template has two main functions: (1) determining what data to read from the database; (2) determining the layout of the website. The
template includes not just the HTML label. Some contents, such as the news lists and news content, cannot be placed directly in the template, which needs to be timely extracted from the database by the station group system according to the access request. The dynamic HTML code is sent to the user’s browser. Therefore, templates need to provide mechanisms to read data from corresponding databases. In addition, due to the increasing diversity of user’s functional requirements and layout requirements, it is difficult for the website group system to provide fixed components to meet the personalized needs of all users. It is very important to provide mechanism for free access of database and flexible export of HTML label. With this mechanism, without affecting the security of the website group system, any required data can be extracted from the database and then installed in any format. SiteFactory and webplus3 provide similar architectures through the ‘label’ and ‘component’ mechanisms. And SiteFactory shows better performance[2][3].

Each label of the SiteFactory corresponds to the independent text file in the server folder. The label parameters can be easily set, such as the column, number, date format, length of the title, and so on. The similar function of webPlus3 is called component. In order to cater for visual editors, the redundant HTML labels could be outputted. The component technology of webplus3 is not flexible and easy to use comparing with SiteFactory.

SiteFactory provides a large number of system labels. The label files of PowerEasy are totally independent with the website group system. Therefore, the label files of one system can be copied directly into another system without special settings. In addition, in order to cater for the variability of the output HTML labels, SiteFactory provides the function of custom label. The developer of the website could write sql statements freely to read data from the database, which can be assembled into suitable HTML code or other front-end data formats for browsers to use based on the xslt rules. This function shows the great flexibility and adapts to the diverse layouts and functional requirements of users, which is the fascination of SiteFactory.

Reasonable Organizations of Subweb and Column. In SiteFactory, all websites are in one column tree, which also is node tree. WebPlus3 has similar function, but it is more complex. The folder tree, column tree and website tree are distinguished in WebPlus3, but they also map to each other. In SiteFactory, the column tree is identical with the node tree and could be infinitely graded. Any grade of nodes can become an independent website. If a website does not want to be accessed through a path and wants to bind to an independent domain name, the root node of the website must be a primary node. If a website does not need an independent domain name, there is no grade restriction on the root node. If the column list and the content of the article need to be displayed, the relevant template must be bound individually.

The template of SiteFactory is usually independent HTML file contains labels, which is placed in server folder and bound through the web management background. Template is not stored in the database, which facilitate their management, modification, and reuse. There are two ways to modify the templates. First, login to the server operating system and modify the HTML template directly. Second, using the web management background to read and modify the template.

The template binding mechanism of webPlus3 is similar to that of SiteFactory, but there are also differences. With webplus3, the default home page, list page and content of every column are bound automatically. Only if one column needs special templates, it would be bound independently. The uploading process of webPlus3 template does not need to login to the server operating system. Instead, it just needs to upload a compressed package that meets the format through the web management background. This way of uploading files improves the security of the system and facilitates the authorization management of template.

Powerful Functions of Publishing, Modifying and Managing Articles

Most of the administrators only rely on website management background to publish, modify and manage articles, and do not know well in the professional HTML knowledge. Therefore, the website group system should provide simple but powerful functions for publishing and managing articles. This kind of function should be easy to operate and cannot be too complex. As far as possible to shield
the complexity of computer operations, it is recommended to conform with the mainstream text editing software, such as word software. For uploading large capacity attachments, such as video, it is necessary to provide a continuous transmission mechanism to avoid breaking easily. The articles generally contains attachments, pictures, and other multimedia resources, thus, the limitation of the upload file size and type is necessary, as a part of the basic function of the website group system. Some articles or columns are just available for Intranet users so that the website group system should provide restricted access mechanism. Due to the development of web technology, the web-based website management background cannot provide WYSIWYG editing function as powerful as word software. When using the website management backstage to manage or add the content of website, if there is a need for deeper adjustment, the administrator are required to be familiar with some simple HTML knowledge.

**Strong Security Mechanism**

Website group system generally is exposed to the Internet, in order to prevent the website from being hacked, a strong security defense system should be provided. In addition, the website group system should have a complete backup mechanism. In the case of attack, the ability to provide data recovery is very important for the clients. Compared to SiteFactory, which is only allowed to be deployed on one server, webPlus3 program architecture defines production server and publish server. The production server implements website content management, and the publish server responses the access of the users. Under such program architecture, the access to production server could be restrict in the Intranet and only publish server could be accessed in the Extranet. So the security mechanism of webPlus3 is more powerful.

After constructions of websites on the basis of the website group system, most of them are managed by the administrators of secondary institution websites. Therefore, the website group system should provide a login mechanism based on user name and password, and be able to authorize users in the management background. The administrators of secondary institution websites could manage the authorized websites and columns after entering the management background, such as adding, modifying, deleting articles, and other operations within the scope of authorization.

**Authority Allocation Mechanism Based on Login Users**

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**Domain Name and Path Based Access Mechanism**

Due to the good identifiability of domain name, it is beneficial to improve access speed and website promotion. All websites constructed based on website group system should provide a mechanism to bind independent domain names. While it is complicated due to the domain name configuration is required in the domain name server. The website group system also should offer a more easy form for option, which is using the main domain name plus a path for subwebs.

**Static Web Page Pre-generation Function**

Static web page generally refers to a page file with the extension of HTM and HTML. When the web pages based on jsp, php and asp.net are accessed, the dynamic HTML code is generated and sent to the client browser. While the static web page pre-generation technology converts the web page that a user may access to HTML static page in advance. When the user requests to access, the server sends the pre-generation page file to the user directly. The advantages of web page static are as follows: (1) when the user requests to access the page, the speed can be greatly improved because the server does
not need to run the program, access the database and generate dynamic HTML code; (2) reducing the running burden of server, especially when a large number of users access the same time; (3) helping search engines to collect web page information, HTML static pages can make web pages more likely to be included. In view of the above reasons, it is more important for website group system to provide static web page-generation function.

Conclusions

The website group system accomplish the goal of construction and running the faster, better and safer websites. The website group system realizes the unification of technical standards, provides relatively consistent website operation and service specification. The sub websites are interconnected with each other, thus the cluster management is realized. This way of construction website will exist for a long time in colleges and universities. How to achieve faster, better and safer construction and maintenance of large number of websites will be the goal of website group system development. In addition to the above core functions, the website group system also provides functions such as voting, user access statistics and so on, which are convenient for management, but are not core functions.

Acknowledgement

This work was supported by the major scientific research fund of Nanjing Vocational Institute of Transport Technology in 2017 (Project JZ1705) and the ‘Special project of Intelligent Campus’ of Jiangsu Institute of Modern Educational Technology in 2017 (Project 2017-R-59472). The authors also would like to thank the editor and the anonymous reviewers for their work on this paper.

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