Dynamic web page generation for Academic Institutions.

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Abstract: - The WWW has become the most important way to provide visibility of academic institutions. In particular WWW is the natural way to offer academic colleagues and general public the new way of showing research project results. On the other hand, due to the diversity of computing platforms in Academic Institutions, WWW is useful for the academic authorities to obtain information. In order to combine these two goals in this work we present a dynamic web page generation system based on the philosophy that the creator of the information is responsible of its contents. Our proposal uses the recent open source developments, used in such way that the web site is only virtual and constructed on demand. This dynamic web page generator has been working and improved the last four years.

Key-Words: - Databases, website, webpages, open source technology, academic institutions

1 Introduction

One of the characteristics of the academic institutions computing platform is its diversity. In these institutions one can find many platforms and operative systems working together in the local network. This creates a challenge for the software developers when the central administration requires an automated system to capture reports from the academic staff. This challenge can be surpassed if the World Wide Web (WWW) is used to capture the information in a database. On other hand, currently the WWW is the most important way to provide visibility of academic institutions [4] and is an excellent form to popularize recent results of research projects in a fast way. The academic staff appreciates if they are giving the information to the central administration and updating their webpages with their recent research results at the same time. In this manner the software developers will obtain two goals: an academic reporter system and a webpage generator in a dynamic form. In order to deal with this purpose, in the specific case of Energy Research Center (CIE-UNAM), we have developed an open source information system to collect the annual academic report required by the central administration which can be updated any time through the year using a web browser. We store this information using PostgreSQL through an interface built with Perl, AxKit and XSP. With these databases we build a dynamic web site using open source technology in such a way that the web site is only virtual and constructed on demand.

2 Problem Formulation

The academic institutions use the WWW because it provides visibility and allow to get information. The WWW makes possible the interoperation between researchers or other institutions. And it is excellent to make web services like databases applications[4].

There are many softwares and procedures available to generate dynamic webpages; as an example, we can mention: ASP, Visual Basic, SQL Server; XSP, Java, JDBC; XML, Perl, PostgreSQL, etc. With this idea in mind a first version of the system was developed using Perl, CGI and PostgreSQL technology, following also the standard procedures as shown in Fig. 1. In such procedure we accessed PosgreSQL database through CGI's built in PERL and displaying the information in webpage based on HTML. This procedure has the disadvantage that the CGI´s programs are running and consuming processor time on the web server. Another disadvantage worth mentioning is that if the information to be displayed suffers changes or the form of displaying the information changes, then the CGI' s programs must to be changed involving time programming. This form of creating webpages implies a static point of view moreover this procedure uses a non specialized software as PERL.
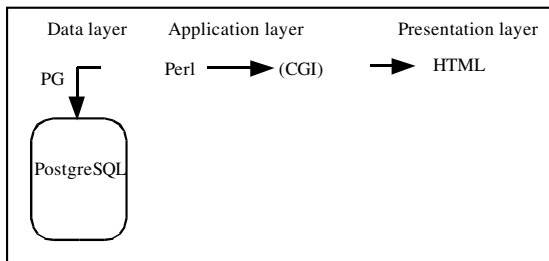

Fig. 1 Traditional scheme for creating dynamic web pages

3 Problem Solution

In order to surpass the mentioned disadvantages but conserving the idea of linking these two systems (capture information and dynamic webpage generator) incorporating dynamic aspects as flexibility, object oriented programming and the use of the frontier and open source tools we propose a new procedure. The schematic of the new a proposal to generate dynamic web pages is illustrated in Fig. 2.
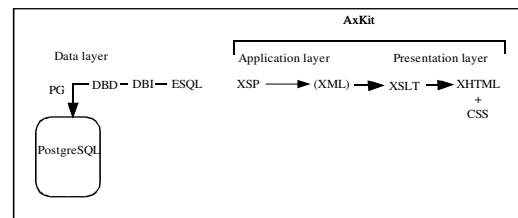

Fig. 2 Schema of our proposal

In our proposal, PostgreSQL database with AxKit is used in two steps: the first incorporates XSP to generate XML and XSLT to transform in XHTML code with the extra-point of adding the possibility of having style sheets (CSS). These last features add more friendly display. The appearance of the webpage can also be changed easily through the CSS. This procedure does not require to have a program running and the software can be easily modified. Our proposal is possible due to the fact that AxKit is an XML Application Server for Apache that provides on-the-fly conversion from XML to any W3C standard format[1]. Thus the procedure leads to a flexible code; and it also uses a built-in Perl interpreter to provide some powerful techniques for XML transformation. This is the key point making the

difference between the standard procedure, Fig. 1 and our proposal, Fig. 2.

In particular the dynamic web page generation system is based on a client-server technology made in three layers:

- Data layer. PostgreSQL.
- Application layer. Ax:Kit-XSP.
- Presentation layer. Ax:Kit-XSLT. XHTML+CSS.

One possible problem is the security of the information. Due to the fact that the academic staff is required as the information provider, it is necessary incorporate a security modulus. Thus the new system include an authentication tool for Apache using AuthPAM [2]. PAM (Pluggable Authentication Modules for Linux) is a suite of shared libraries that enable to the local system administrator to choose how applications authenticate users. We do not need to rewrite a PAM-aware application in order to change the authentication method.

Using PAM we are able to authenticate users using the system password database, or an external authentication source such as PostgreSQL database, Windows PDC, LDAP, or even a simple list of users in a text file. We can add date and time constrains also, and even have different authentication methods among different sections of the web site. All of these without changing a single line of perl code.

Add a SSL (Secure Socket Layer) service and the sensitive user information (login, password, etc.) can not be easily observed on the wires. One important point to be stressed is that users must know how to indicate theirs browsers not to store these sensitive information, specially if they are using a public computer or a borrowed one.

For increase the security, it is important to have regular maintenance to databases [5]; regularly we saving our database into a script using PostgreSQL tools (PG_DUMP), but we are working in automatize that manual process.

4 Conclusion

In the CIE, we use the WWW for two purposes: to obtain information trough capture system and to maintain the researcher personal web page updated. Besides the information is protected by the security module. The whole procedure is shown in Fig. 3
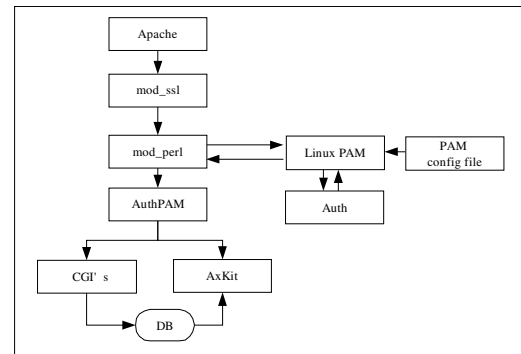

Fig. 3 The overall organization of Linux-PAM is described

This reporter system has been opened to capture information all year around allowing the academic staff to update the information as soon as the information arrives. Thus, with this procedure the webpage is easily updated and the visibility of the main research products is increased. The form of implementation this procedure assures that it can be used from any available operating system. This procedure has been implemented for the Energy Research Center of the National

Autonomous University of México (UNAM) [3] and it has been working and improved for four years using its advantages.

With the present system we can quickly, securely and trustworthy obtain the required information by the central administration, and therefore use that information to build webpages dynamically. On the other hand, the academic staff themselves are in charge of maintaining the information updated.

We used open source technology (XML, XHTML, CSS, XSP, PostgreSQL, Perl, Apache, OpenSSL, Linux). Currently this system is being considered to be installed in other UNAM Institutions. Now they have two web pages, one created by this system (called "institutional web page") and other created by themselves (called "personal web page").

An analysis of performance in function of efficacy and efficiency, indicates that this developed system is successful because the necessity that CIE had was covered. The users have taken this system as part of their diary activities and observed their advantages in having their institutional web pages updated. This statement is obtained from the fact that there are a few academics providing additional information in their personal web pages as it can be seen in [3]. In other hand we use free resources and we minimize the time involved in the construction web pages.

According with their purpose, we can say that this developed system is a QoS and is susceptible for apply metrics or measurements [4].

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