and maintenance of software for distributed corporate systems with a maximal convenience. Its software is called CORBA-application.

Each object requests broker ORB producer, which, practically, is the CORBA, theoretically can propose its own protocol of transport service for data transmission. In this case the expanded name of technology, for example CORBA/IIOP, which reflects the name of the IIOP network protocol. With the aid of IIOP protocol any CORBA/IIOP application can interact with other CORBA/IIOP-applications independent of hardware, software and operation systems producers.

Conclusion

The realized scientific research and practically developed works certificate that in the near future the most perspective are object-oriented Java RMI technologies and component-oriented EJB-and J2EE-technologies for the distributed corporate systems design. The EJB-and J2EE-technologies application is expedient in systems, based in using a powerful DBMS as the systems kernel. For a example, it can be the e-commerce systems, banking systems, business platforms and e-shops.

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Author's Information

Dr. Safwan Al Salaimeh – Assistant Professor, Department of Computer Science, Irbid National University, Jordan

USE OF DYNAMIC TECHNOLOGIES FOR WEB-ENABLED DATABASE MANAGEMENT SYSTEMS

Galina Bogdanova, Todor Todorov, Dimitar Blagoev, Mirena Todorova

Abstract: In this paper we consider two computer systems and the dynamic Web technologies they are using. Different contemporary dynamic web technologies are described in details and their advantages and disadvantages have been shown. Specific applications are developed, clinic and studying systems, and their programming models are described. Finally we implement these two applications in the students education process: Online studying has been tested in the Technical University – Varna, Web based clinic system has been used for practical education of the students in the Medical College - Sofia, branch V. Tarnovo

Keywords: Computer systems and Web technologies, Databases, PHP, JSP, education.

ACM Classification Keywords: H.2.4 Systems, H.4 Inforamtion Systems Applications, J.3 Life and Medical Sciences, K.3.1 Computer Uses in Education

Introduction

For some time past World Wide Web is migrating to active websites, which allows to send to the user pages, configured according to his/her own requirements and offer more dynamic experience with browsers. Such sites are created with the help of a combination of programming languages and technologies, which can be used at once, or one by one.

HTML (Hypertext Markup Language) is still the more important technology for visualizing in the Web. HTML is designed in the middle `90s for the creation of text-based documents containing commands for basic formatting (markup) as well as links to other information (hypertext). Although HTML evolved and many improvements have been added, it is in itself still static. The next step is the dynamic Web technologies, which allow the building of active websites [Water, 1998], [Pardi, 1999].

Some dynamic technologies and their application in the creation of Web based systems for database management are considered in this paper. In the second section short overview of the most familiar dynamic Web technologies, is made. In the third section two applications, are described – clinic and studying systems, which use dynamic technologies from the client and from the server side. The project for on-line studying have been implemented in the Technical University – Varna, branch V.Tarnovo. The online clinic system has been used for the practical education of the students in the Medical College - Sofia, branch V. Tarnovo.

Technologies for Building Active Websites

These technologies could be classified as follows:

A Dynamic technologies from the client side
- A1 Java applets
- A2 Active X controls
- A3 DHTML (Dynamic HTML)

B Dynamic technologies from the server side
- B1 Common Gateway Interface (CGI)
- B2 Active Server Pages (ASP)
- B3 Java Servlets and Java Server Pages (JSP)
- B4 PHP
- B5 Patented API's for Web servers (ISAPI and NSAPI)
- B6 Server Side JavaScript (SSJS)

We will overview the most famous dynamic technologies from the client side (A).

The Java applet is a program written in Java, which can be inserted in an HTML page. Because the applet is written in Java it can take all the advantages of the language i.e. it exists separately and is multiplatform.

The ActiveX controls are independent programs, also known as components, which are written in some programming language such as C++, Delphi or Visual Basic. When added to a Webpage they give specific functionality, for example graphs or charts, timers, identity verifiers of clients, or database access. The ActiveX controls are inserted into HTML pages via the <OBJECT> tag, which is now part of the HTML standard. When added to a Web page the ActiveX controls can be executed by the browser or by the server. They are designed by Microsoft and are supported only in ActiveX-enabled browsers. For now they work only in Internet Explorer and therefore cannot be considered as multiplatform.

DHTML allows to use regular HTML, scripts, dynamic object model, absolute positioning, dynamic styles, multimedia filters and many other technologies for dynamic text and graphic manipulation, which HTML shows on the screen.

The scripts are blocks of program source code, which is inserted into the Web pages and is interpreted during execution. This means that a text file with HTML code also contains additional text with commands for the browser.

Internet Explorer supports two languages for writing scripts – Visual Basic Script (VBScript) and JavaScipt. The script languages have some security-related restrictions and are not as fast in the calculations as the compiled programs.

We will now overview the most famous dynamic technologies from the server side.

A CGI program can be written in any programming language. The most popular language for CGI programming is Perl. Web servers that can execute CGI programs act like a gate between the user's request and the data that he/she requests. The main disadvantage of the CGI programs is that scaling is not so well covered. Any time

when the server receives a request a new process is created. This way the server can get very load up and freeze.

ASP combines HTML and writing scripts for the server side in one file, called Active Server Page. When the server receives a request for an ASP he will execute the code that is built up in it and will return an HTML page to the browser. As script languages can be used VBScript, JScript. One big disadvantage of ASP is that they can be used only in web servers running Microsoft operating systems.

JSP are technologies from the server side that use the Java language [Bruce, 1998], [Marty, 2001].

Java Servlet is a program from the server side that handles HTTP requests and returns the result as an HTTP response. Good analogy to a servlet is a non-visual applet that works on the server. The lifetime is comparable to this of the applets and runs inside the Java Virtual Machine (JVM). In contrast to the applets the servlets have no graphical interface. The servlets are a Java technology that corresponds to the CGI programming. One JSP-page contains HTML, Java code and JavaBean components. When the user sends a request for a JSP file the web server will first generate the corresponding servlet, if one does not already exist, execute this servlet and return the received content as a result to the web-browser.

There are two ways to access a JSP-page:

- The client request is sent directly to the JSP. In this case it is assumed that web pages have access to JavaBean components, which perform certain well-defined actions, such as database access.
- The client request passes through a servlet. The servlet generates a dynamic content. In order for the response to be sent the servlet creates a Bean. Then the servlet turns to the JSP, which represents the content along with the one generated from the servlet and stored in the Bean.

JSP and Java Servlets have the same disadvantages that has Java, that is used on the client side: Java is comparatively hard to learn language from the beginner programmers.

PHP works like ASP and JSP: the sections with scripts are framed with the tags <?php..?> and are inside the HTML page. In contrast to ASP, PHP is an independent platform and has different versions for Windows, Unix, Linux and for many Web-servers, including Apache and IIS, as main reason for this is that this product if free and with open source (Scollo, 2001).

There exist many Web servers that can be used with PHP, for example Xitami, but Apache is the only Web server for whom PHP can be compiled as a module.

Some of the advantages of PHP over HTML are:

- The editing of the Web page is made easier by just actualizing the information in the database instead of changing the whole HTML code.
- Creating pages which will be configured in such a way that to show only what the concrete user is interested into.
- Showing and modifying databases contained in the Web page and a possibility for performing manipulations on the data, such as sorting.
- Creating pages, which rotate through series of different graphics.
- Receiving information from a user and returning data to the user according to this information.
- PHP supports application programming interfaces (APIs) for access to different database types, such as Oracle, Sybase, PostgreSQL, MySQL and others.
- Programs written in PHP can use APIs for access to the data in the database when needed. ODBC (Open Database Connectivity) is a standard application programming interface for access to databases that support PHP.

Web Based Database Management Systems that use the Dynamic Technologies

We will present two particular applications: WEB-based clinic system and On-line studying system, during the development of which dynamic technologies from the client and from the server side, are used (A2, A3 и B3, B4).

The data is represented by relational databases – combination of interconnected and stored in one place data with the presence of such minimal excess that allows their use in optimal way for one or more applications [Teorey, 1996]. The relational model of the database is based on two-dimensional tables. The columns are called

fields and the rows - records. For every object or different type information is created a table (relation) in such a way that these requirements are kept: every field in one table is homogeneous, no two identical records exist, the names of the fields are unique etc.

WEB-based system for clinic management "Online clinic"

During the development a user two-tier configuration is used consisting of Application Space and Database. The application space uses a web-browser, which communicates with Apache Tomcat Server through HTTP. The used JSP technology extends the web-server by communicating with an Access database through an ODBC driver (Figure1), (Marty, 2001), (Gruber, 2001).

In the current web-based clinic system a development approach is used – a combination between the two most used techniques - side-centric and servlet-centric. The application is built by a multitude of interconnected JSP pages, which interchange information, but JSP pages without visual elements are used too. They remain hidden to the user and take care of the program logic. The access to a JSP-page is made in the way shown on Figure2.

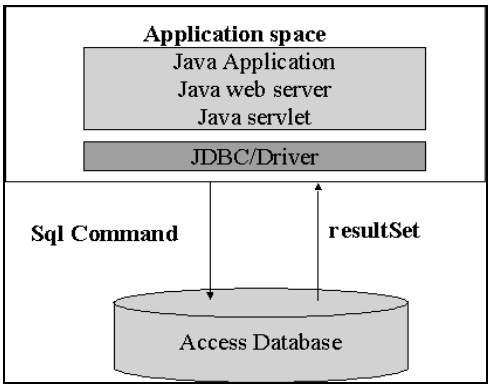

Figure 1

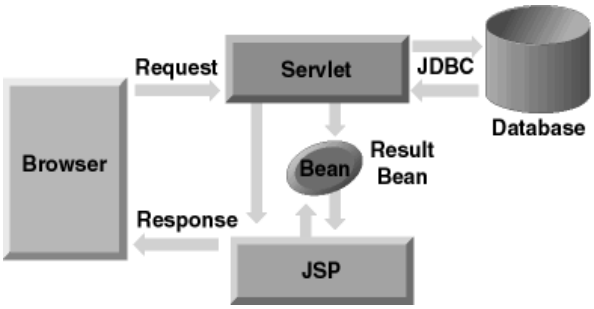

Figure 2

Their action can be summarized in the following steps:

- Reading sent data from the user – most frequently entered in a form field, but can also be sent by a Java applet or an HTTP client.
- Looking for additional information coming from the HTTP request.
- Generating answers – interaction is possible with a database or other applications.
- Formatting the results inside the document.
- Determining the corresponding parameters of the HTTP response – type of the returned document, cache parameters etc.
- Sending the document back to the client.

The developed system represents a client module, which is oriented to the client's ability to communicate with a clinic.

Basic features of the application are:

- Each patient is given a unique username and password with which he/she can use the services of the clinic.
- Each patient can get information for the physicians in the clinic.
- Each registered patient can book at a desired physician in a desired date, or can change or cancel a previously made book.
- Powerful and multi-criteria searching system for information.
- User-friendly interface.
- Fast request processing.

On-line studying system "Mindcheck"

In the development of the on-line studying system "Mindcheck" a two-tier configuration, is used that consists of Application Space and Database, which communicate through PHP code. The application space uses a Web-

browser, which communicates with an Apache server through HTTP. The database is maintained by a MySQL server.

The PHP actions, shown on Figure 3 are:

- Reading the request of the browser;
- Finding the requested page on the server;
- Executing the instructions stored in the PHP code to modify the page;
- Sending back the page to the Internet browser.

Figure 3

The relations in the database are shown on Figure 4.

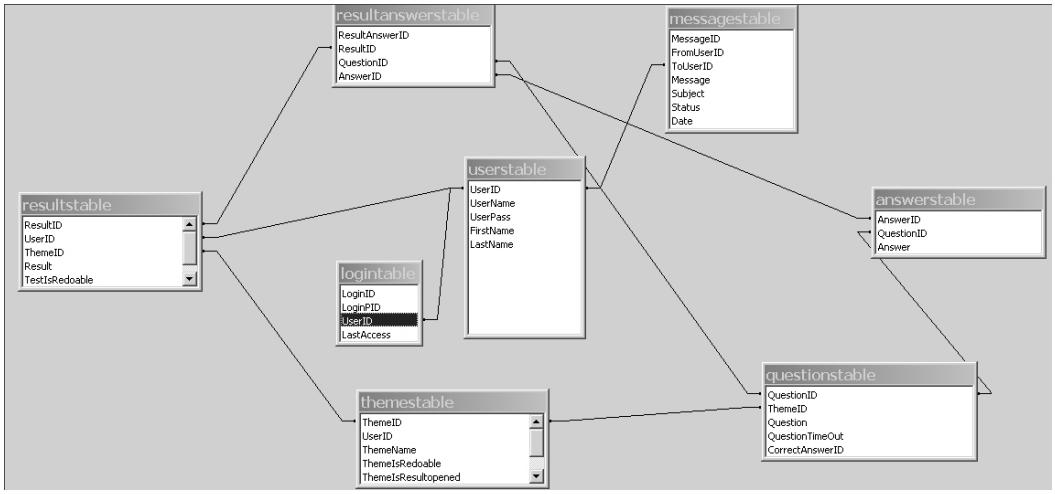

Figure 4

The instruments used in the development of the application are: Microsoft Internet Explorer 7.0, PHP Version 5.2.1 [Scollo, 2001], MySQL 5.0 [Gruber, 2000] and Apache HTTP Server Version 2.2 [Schildt, 2001]. This dynamic technology from the server side is distinguished with its efficiency, flexibility, easy configuration, working with many clients simultaneously. The client is granted security and stability during work, the developers – many tools for error elimination.

An ActiveX technology from the client side is used for studying computer mathematical programs [Bogdanova, 2003].

The Web-based studying system is asynchronous. The study is guided from special instructors or from the creators of the themes themselves [Dragon, 2001]. The users can interact in between through on-line messages or e-mail.

The main features of the application are:

- Each user is granted his own unique username and password.
- Searching for other users registered in the site.
- Easy and convenient user interface.
- Making tests on particular themes.
- Evaluation and comparison of the answers of the tests.
- Users can create their own tests.

- Uploading tests from a text file.
- Creating tests by keyword and level of difficulty.
- Multilanguage support.
- Teachers can supervise the work of the students.
- Test authors can see the results and answers of the users that made their tests.
- Fast request processing.

The on-line testing complements the services in the studying system "WebSchool", included in the project

Implementation of the systems

The project for on-line studying is tested in the Technical University – Varna, branch V.Tarnovo, with three courses for the "Business Information Systems" (Master Degree) – "Business Applications", "Databases", "Macroses in MSOffice". The site is translated into three languages: French, English and Bulgarian. In the "WebSchool" part there are lectures and exercises about "Mathematics", "Informatics", and "Biology".

The project won a special reward at the "Le concours Soft-Qui-Peut" concourse, Poitiers, France 2003.

The first version of web-based clinic system has been developed as a graduated work in the V. Tarnovo University and then has been successfully tested in the practical education of students in the Medical College - Sofia, branch V. Tarnovo

Conclusion

Mindcheck's task is to facilitate not only the students but also the teachers during the processes of learning and testing, while taking into consideration the requirements of the users. In it the users are granted better ways for checking his/her knowledge and the instructor/examiner has more active participation in the studying process. Protecting the studying material with technologies for digital signature is foreseen.

The use of the "Online clinic" will facilitate the physicians when creating their schedule as well as patients when booking and when searching information for the offered services. Priority for the future development on the clinical system is the implementation of the administrative part of the application.

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Authors' Information

Galina Bogdanova - Institute of Mathematics and Informatics, BAS, Acad.G.Bonthev St., bl.8, Sofia-1113, Bulgaria; e-mail: galina@moi.math.bas.bg

Todor Todorov - Institute of Mathematics and Informatics, BAS, Acad.G.Bonthev St., bl.8, Sofia-1113, Bulgaria; e-mail: todor@moi.math.bas.bg

Dimitar Blagoev - Institute of Mathematics and Informatics, BAS, Acad.G.Bonthev St., bl.8, Sofia-1113, Bulgaria; e-mail: mitaka911@gmx.com

Mirena Todorova - Sofia University St. Kliment Ohridski, Bulgaria; e-mail: mirena_t@yahoo.com