Toolkit to Support Databases in Internet

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Abstract

Technology, used for application creation, which allow remote access possibility to DBMS (database management system) (DBASE, Paradox, FOXPRO, Microsoft Access, SQL - server and etc.) for users by means of Internet is described in this article. The forenamed technology uses Microsoft Windows NT 4.0 platform and Microsoft Internet Information Server software.

The main advantages consists in:

- Application real multiplatformity providing (Win 95/NT, OS/2, Unix, etc.);

- Existing possibility of different computer utilization (IMB PC, Power PC, etc.);

- Internet application developing, able to interact with Database, basing on this technology, possible in smaller time interval.

In this work blocks are represented, in accordance to which SQL (Structured Query Language) instruction have been set. SQL instructions perform the main operations, connected with DBMS data manipulation (choice, adding, editing and deleting operations).

Technology represented in this work has been used in several business projects.

This research might be useful for WEB designers and Internet application developers.

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1. Introduction

DBMS (Database Management System) are used for storage and handling of complicated information (DBASE, Paradox, FOXPRO, Microsoft Access, SQL - server and etc.). Due to work sizes growing and demands to operational swiftness increasing appears real necessity in giving access to this information for remote user. It is not important if these users belong to this organisation or they are some external consumers of information. A simple and convenient mechanism is needed, which could allow request to DBMS via Internet.

Basing on Microsoft Windows NT 4.0 and Microsoft Internet Information Server (IIS) software, in principle, it is possible to realise transparent access to DBMS quite easily. The results of new technology developing, which allows to carry out effective access, are represented in this article.

It is important to note that there are no final method of projecting and implementation, embracing the whole vital cycle of data handling and preparation system for allocation in Internet. Internet application developers often meet the problem of time shortage, when it is necessary to create application rapidly and to make work dealing with DBMS application on remote server in case of emergency. In this case there are a lot of ways to increase the efficiency of given technology. One of them is creation of flexible modules, which can easily be connected and adapted to any new task. This principle is used in the given work. In spite of some redundancy of this technology, the term of developing is decreasing much. And even more, the quality of such system could be much higher, because all included software modules (or decisions) have been already tested.

The problem consists in less flexibility of some restrictions of proposed instruments as a whole, connected with swift growth of this industry and appearing of different, sometimes incompatible software from other vendors. The essence of this work is included in distributing of functional blocks, which allows to make application swiftly, and this would interact with existing database and give to remote user some forms (HTML - pages), which make it possible to manipulate this data (to extract, add, delete, etc.). As a result creation technology of WEB site for organisation from some fixed set of IDC fragments was developed.

1. Functionally full modules set, which allow quite fast (in limits of a month) creation of WEB site for organisation with possibility of access to DBMS.

2. Access to DBMS is realised with IDC application (IDC - Internet Database Connector - access to DBMS via Internet). In principle, exists more advanced mechanism - ASP (Active Server Pages), which allows WEB site creation for organisations, but in this mechanism are less obvious the "modules", on which associating with existing DBMS will be performed.

3. In most cases used DBMS are fully relational (or, at least, convenient to some Kodd's rules, which define conditions of DBMS relativity), what is on local computer, evident, fully used in conditions of DBMS working. During WEB sites projecting there are more important such properties of DBMS as data extraction rate and database indexes preliminary loading to memory. Exactly at this time could appear the situation of preliminary data handling and according preparing of tables and requests (creation of supplementary indexing tables) creation.

2. Technology overview

The proposed technology consists in realisation of such stages.

By means of different components (such as protocols, and services) server configuration is carried out. First of all it is necessary to ascertain the compliance of computer's names in local network with their IP addresses. For this such tunings should be made:

1. TCP/IP protocol names and addresses compliance on server and local network computers.

2. DNS service installation on Windows NT 4.0 server.

3. All computers should be tooled on local network DNS server.

TCP/IP protocol turning operation includes address space destination operation, correct IP-address of each network computer choice (as a rule, this function is provided by network administrator). After this, one more service should be set - DNS (Domain Name Service). This service defines some virtual area, which is called server, and is defined to Server List, such components as area, domain and hosts are set in accordance to server list. The forenamed elements form the way to local network servers' resources and serve for their identification.

The previous operations were accomplished on server and they have made all necessary for local network computer attachment to DNS server. This attachment was made by means of tuning, providing on DNS server (TCP/IP protocol properties) on pre-formed route (server.domain.area or record.area). Each network computer, which realises DNS

server functions, could be attached with IP-address indication.

This stage is a first step to Internet introducing that means Internet services functioning in the bounds of office local network.

The next stage consists in Internet services turning.

Internet services include:

- World Wide Web (WWW);
- File Transfer protocol (FTP) servers
- E-mail
- News servers
- Gopher servers
- Telnet

As a result of Internet Information Server installation we have such services:

- FTP Publishing Service, which control all TCP/IP incoming messages to FTP (File Transfer Protocol) services.

- Gopher Publishing Service controls all TCP/IP incoming messages. Performs FTP service functions, but possesses more opportunities set in comparison with them. Allows references on files and folders organisation on remote computer and personal menus forming.

- World Wide Web Publishing Service controls all TCP/IP incoming messages, but related to WWW service only.

Each of them is supported and administrated by Windows NT core directly.

Virtual directories should be appointed for WWW service, on which browsers will reference. For example, appearing to virtual directory, which includes computer shop HTML page, in Internet Explorer it is necessary to indicate http://main/cs/cs.htm in address field. It was virtual directory CS, where computer shop is situated.

In such way it is possible to model remote data control in local network bounds on the stage of Internet-oriented application creation.

Now it is possible to describe directly database interconnection technology with WEB application pages.

Standard HTML and idea of interconnection with Database by IDC (Internet Database Connector) are taken as a base. The main element are IDC blocks and according them SQL instructions, which are set enough for main operations over database definition. Every IDC block defines one operation.

SELECT Instruction picks out data from Database. In defines what table, and on which fields picking out could be performed. On chosen data could be set some restrictions, the order of sorting (in increasing or decreasing manner), and the

form of chosen data final representation (field order and structure).

INSERT INTO Instruction inserts record or records to the table. Defines in which table and basing on what source inserting would be performed. Adding of one record or block of records, which were formed as a result of select instruction is possible.

UPDATE Instruction - creates request for fields refreshing. Defines in which table the data refreshing should be done, basing on given choice condition.

DELETE Instruction - creates request on records deleting in one or several tables. The data enumerated in FROM sentence and complying with given condition could be deleted.

Each IDC block contains one SQL instruction or their combination. The result of operation is indicated in HTX file, which contains output control elements

(<%begindetail%> … <%enddetail%>)

and condition operators

(<%if%> … <%else%> … <%endif%>).

For user interface ensuring and some functions between HTML element - script

<SCRIPT LANGUAGE="JavaScript"> … </SCRIPT>, inside which Java language covenants are legal.

As a result of accomplished work IDC (Internet Database Connector) code blocks were received. On the base of this applications interact with DBMS on the level, which is transparent for user. Transparency means:

- it's no need for remote user to know the format of represented Database;

- which driver (or process) is a "gate" between HTML page and Database;

- in which way are the transmitted data encode for transmission (are enciphered in case of SSL directory) and decoded on other side.

Technology, represented in this work, is realised in Microsoft Windows NT 4.0 and WWW server (Internet Information Server) platform and was successfully used in several business projects (see Publications chapter). It's important to note the doubtless advantage - the real application multiplatformity is provided i. e. different types of OS (Windows 95, Windows NT, OS/2, Unix) usage for work with one DBMS became possible. Besides, it's important to point - researches in this field are prospective, the results were turned out well to adaptation for usage in ASP (Active Server Pages).

It was easy to notice that the main problem was in procedures, connected with SQL instructions, tooling. IDC blocks describe instructions SQL, which allow data manipulation. These four instructions (SELECT, INSERT

INTO, UPDATE and DELETE) are the minimal set, without which DBMS data manipulation is impossible. Microsoft Windows NT 4.0 tooling description and supplied together with it Internet Information Server description would be useful for those, who plan to deal with WEB application, or in case, when developed application should work in Intranet, i. e. in the range of local network. It's much favourably to locate the developed application on Internet Services Provider server in this region. Among advantages one can mention considerable gaining in rate, because all attended to developing and testing operations stages is performed on local network, so quality of phone lines is not important. The given technology can allow developing term reduction for WEB applications designers, i. e. to reduce costs.

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Publications

http://dbInet.com/cs/cs.htm - Computer Shop with functions of consumer as well as shop administrator. This research is a demo sample.

http://209.64.33.51/cdshack - CD Shack - computer shop of audio disks for sale. The developing, which was founded on real Database, includes information about albums and concertos, recorded on CD.