Research on Management Information System for Construction Market based on XMLHttp+XML Database Synchronization

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***Abstract*—At present, it is necessary to use management information system for construction market to improve the efficiency of the supervision, save the supervision resource and reduce the supervision cost. In the inspection module, it is essential to use allopatric ACCESS database synchronization, because of environment and cost. This paper introduces advantages and disadvantages of some ACCESS databases. Specifically, the flow chart and the key codes of the XMLHttp+XML are explained.**

Keywords-Database Synchronization, Management Information System for Construction Market, XMLHttp+XML, ACCESS Database

I. THE ENGINEERING BACKGROUND OF THE MANAGEMENT INFORMATION SYSTEM FOR CONSTRUCTION MARKET

Due to the construction engineering related to many things, the construction process is a complicated synthetically process. Adding to the fixed place, the ambulatory production, the different structures, the quality requests, the different construction methods, the large figure, the holistic, the long periods, and it is decided by natural conditions, it is more difficult to control the quality of the construction than other industry productions[1].

The architecture market management information can make the management standardization and the decision scientific. It also can improve the administration efficiency and the supervision ability, and reduce the manage cost. According to the policy research, it has reached agreements below:

A. It should be improve the integration of the supervision, aiming to the every department of the architecture market management closed and independence, it also should deepen the architecture market management reform, transform the government function, consummate the supervision system, enhance the harmonize management between different department, improve the supervision integration.

B. Breeding architecture market credibility system, establishing the self-restricting mechanism through building credit rewarding and punishing system.

C. Improve supervision efficiency, reduce the manage cost, implement difference supervision system, in architecture market management, according to different situations, different intensions difference supervisions are implemented[2][3].

There into, management information system for construction market is the only way to improve the administration efficiency and the supervision ability, and reduce the manage cost.

II. THE NECESSITY OF THE ALLOPATRIC ACCESS DATABASE SYNCHRONIZATION USED IN MANAGEMENT INFORMATION SYSTEM FOR CONSTRUCTION MARKET

Because many companies and projects are involved in management information system for construction market, the management standardization and scientific decision can't be satisfied by the C/S software architecture, the B/S software architecture which can realize the information integration and sharing in each construction unit and management department, is used in management information system[4]. Limited by the funds, .NET+ACCESS are used at present. In recent years, .NET is the main Microsoft platform, which has well developing performance and inherits ease of use of the developing performance before. Therefore, it provides support to the software developing and the system extending [5].

In the inspection module of the system, the inspectors need field determination, which can verify an engineering registration worker whether an affiliated worker or not and register the attendance. Because in some remote construction sites, the network may not be ensured, a local management information system should be established in order to obtain the inspection instant record. The working flow chart is shown in figure 2. Therefore, when the inspectors return the office, it is necessary to finish the ACCESS database synchronization. The synchronization process should have the flowing characteristics.

A. Limited to the technical level of the operator, the synchronization process should be simple.

B. Owing to the inspectors enforce in groups at present, the system should support multiuser server interaction.

C. Because the importance of the data, the synchronization process should be transparent in order to ensure the original data transferability.

III. THE ALLOPATRIC ACCESS DATABASE SYNCHRONIZATION AND THE SCHEME SELECTION

A. The synchronization by the tools in ACCESS

In ACCESS database, there are 3 tools of database synchronization. They are briefcase synchronization

Published by Atlantis Press, Paris, France.

replication, Microsoft Access synchronization and Microsoft synchronization replication management [6]. But their synchronizations all unidirectional and operations complicated.

According to ACCESS database specific object synchronization, programming is the main form to control and synchronize database. Due to ACCESS database is a file based database application, .NET can't cross-server access directly, excepting remote access authority. Whereas, providing the remote access authority is impossible for the safety of the server. Hereby, the remote access authority is not realistic.

B. The basic scheme of database synchronization using ASP code transferring

On www server and local server programming code are the basic scheme to complete database synchronization. First, on local server, after transferring ASP code and reading local ACCESS library data, the data is written in the ACCESS database on www server by transferring ASP code from www server. Then, the ASP codes are transferred from www server to read the ACCESS library, and the ASP codes are transferred from local server to be written in the local ACCESS library data. So the data synchronization from www server to local server is completed, and the bidirectional database synchronization between local server and www server is completed at last. During this process, recursive calling the allopatric ASP codes is used, so the more resources is needed and it can result in low efficiency

C. The database synchronization by the intermediate documents

In order to solve the problem of recursive calling the allopatric ASP code, the intermediate documents is introduced based on the basic scheme. Also, on local server programming ASP code, after transferring ASP code and reading local ACCESS library data, an intermediate ACCESS database is created and the date is written in the document instead of writing in the ACCESS database on www server by transferring ASP code from www server. So the data synchronization from www server to local server is completed. And the negative direction operation is the same. This scheme solves the problem of recursive calling the allopatric ASP code and is efficiency, but it needs the rights of uploading files and downloading files. Besides, in this scheme, EXCEL document can be used as ACCESS database.

D. The database synchronization by XMLHttp+XML

In order to solve the security problem caused by haywire uploading files, the haywire document is instead of XML formatting objects document, and the XML formatting objects transferring database synchronization is completed by XMLHttp instead of document transferring. Namely, the database synchronization is completed by XMLHttp+XML.

Extensible Markup Language (XML) is a set of rules for encoding documents in machine-readable form. It is defined in the XML 1.0 Specification[7] produced by the W3C, and several other related specifications, all gratis open standards.[8]

XML's design goals emphasize simplicity, generality, and usability over the Internet[9] It is a textual data format with strong support via Unicode for the languages of the world.

XMLHttp is an API available in web browser scripting languages such as JavaScript. It is used to send HTTP or HTTPS requests directly to a web server and load the server response data directly back into the script.[10] The data might be received from the server as XML text.[11] Data from the response can be used directly to alter the DOM of the currently active document in the browser window without loading a new web page document. The response data can also be evaluated by client-side scripting.

The database synchronization by XMLHttp+XML need to programm ASP code on local server and www server also. The ASP code on local server can be used reading local ACCESS library data, converting the data into xml object before the method of XMLHttp.open is used to tranfer the xml object to www server. The asp code on www server receive the xml object and write the data into access database. the data will be returned by the method of Response. Write.This scheme do not need the rights of uploading files and downloading files which could cause the Security Problems.

IV. THE FLOW CHART OF DATABASE SYNCHRONIZATION BY XMLHTTP+XML

Analyzing the characteristic of the database synchronization and comparing the advantages and shortcomings of schemes of database synchronization, the scheme of database synchronization by XMLHttp+XML is adopted in the management information systems for construction market. The flow chart is shown in figure1

V. THE KEY CODE OF THE DATABASE SYNCHRONIZATION BY XMLHTTP+XML

The key code of The database synchronization by XMLHttp+XML include the asp code on local server and the asp code on www server

the asp code on local server consists of three parts

- The key code of building xml object through reading and writing of database and XmlDocumentcontrol
- The key code of send xml object through XMLHttpRequest
- The key code of listening the readyState property of the XMLHttpRequest object for receive xml object

The asp code on www server consists of three parts

- The key code of receiving xml object on www server
- The key code of returning xml object on www server
- The key code of read data from xmldocument

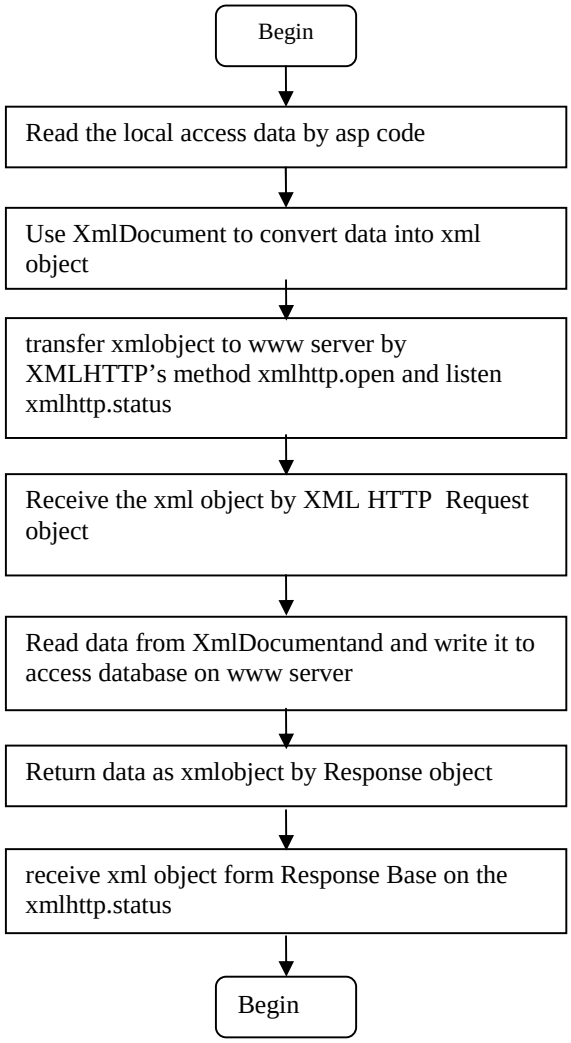

Figure 1. The flow chart of database synchronization by XMLHttp+XML

A. The key code of building xml object through reading and writing of database and XmlDocumentcontrol

```
xmldoc = New XmlDocument
    dec = xmldoc.CreateXmlDeclaration("1.0", "GB2312", Nothing)
    xmldoc.AppendChild(dec)
    xmlfir = xmldoc.CreateElement("project")
    xmldoc.AppendChild(xmlfir)
    xmlsec = xmldoc.CreateElement(dr("pjname")
    If dr.HasRows Then
      Do While dr.Read()
        xmlthi = xmldoc.CreateElement("pjconst")
        xmlthi.InnerText = dr("pjconst")
        xmlsec.AppendChild(xmlthi)
        xmlthi = xmldoc.CreateElement("pjbuild")
        xmlthi.InnerText = dr("pjbuild")
        xmlsec.AppendChild(xmlthi)
      Loop
    End If
    xmlfir.AppendChild(xmlsec)
```

B. The key code of send xml object through XMLHttpRequest

```
aserver = "http://www.abc.com/server.aspx"
xmlhttp = CreateObject("Msxml2.XMLHTTP")
xmlhttp.open("post", aserver, False)
xmlhttp.setRequestHeader("Content-type", "text/xml")
xmlhttp.send(xmldoc.OuterXml)
```

C. The key code of listening the readyState property of the XMLHttpRequest object for receive xml object

```
If xmlhttp.status = 200 And xmlhttp.readyState = 4 Then
    aaa.LoadXml(xmlhttp.Responsexml.xml)
End If
```

D. The key code of receiving xml object on www server

```
xmldoc.Load(Request.InputStream)
```

E. The key code of returning xml object on www server

```
nodelist = xmldoc.SelectSingleNode("project").ChildNodes
For Each xn In nodelist
    nodelist1 = xn.ChildNodes
    aaa = xn.Item("pjbuild").InnerText
Next
```

F. The key code of read data from xmldocument

```
Response.Clear()
Response.ContentType = "text/xml"
Response.Write(xmldoc.OuterXml)
```

VI. RESULTS

The database synchronization by XMLHttp+XML do not need both the rights of uploading files and downloading files which could cause the Security Problems and the more resources by recursive calling the allopatric ASP codes which could slow the system. At the same time, it can define the data which is tranfered between the local server and www server freely. In a word, it is a effective way for database synchronization

ACKNOWLEDGMENT

We acknowledge the financial support provided by theNatural Science Foundation of Hebei Province, China 10213518D

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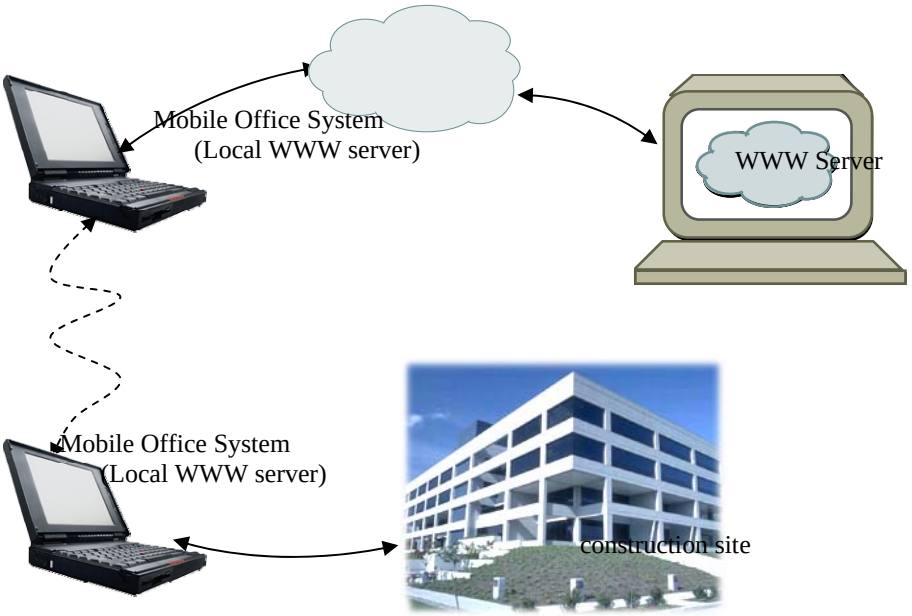

Figure 2. The working flow chart of the construction sites inspection module