Transmitter Station Remote Monitor System Based on Browser/Server Structure

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Abstract

Radio and television was an important way for people to acquire information. In order to ensure the normal work of the transmitter, we used computer to real-time monitor the transmitter working status, find abnormal situation and handle exception in the broadcast. Transmitter automatic monitoring and controlling system mostly hadn't been constructed or developed remote monitoring system, a few monitoring system was based on Client/Server structure. Browser /Server technique had a better development in monitoring field,so we realized the system Based on Browser /Server structure.The Transmitter Station Remote Monitor System Based on Browser /Server structure in the concrete realization had two innovation points:one was that the system of integral logical structure adopts Browser /Server structure of three-layer system, the other was that in the system software code realization, the page dynamic refresh of real-time monitoring and remote print adopted the Ajax technique.

Keywords: Browser /Server   Remote Monitor   Ajax

1. Introduction

Radio and television is not only an important way for people to acquire information, but also the important national policy propaganda media. It occupies an important position in People's Daily life and that ensure its normal work is the important segment of the guarantee transmitter broadcast radio and television programmers normal work. Using the computer to real-time monitor the transmitter working status, find abnormal situation and handle exception in the broadcast, the factors affect the normal bottomed out.its meaning lies not only monitoring of the transmitter operating states and parameter, more important is to improve the reliability and stability of the transmitter broadcast system, ensure safe operation.

At present domestic transmitter automatic monitoring and controlling system mostly haven't been constructed or developed remote monitoring system, a few pad developed are Server/ Structure(C/S) of the monitoring system. Browser /Server (B/S) structure is developed on the basis of C/S structure, B/S technique has been have a good development in monitoring field, now has basic can realize all functions of C/S structure [1]. The Internet and its application technology vigorous development, based on Web of B/S structure will most likely be network computing in this era calculation model, so will broadcast TV transmitting station remote real-time monitoring technology and B/S model combining, can certainly greatly improve the launch pad remote real-time monitoring of level, and has important practical significance [2].

Transmitter Integrated Monitor and Management System (TIMMS) is our laboratory studies, integrated supervision monitoring system in certain areas of multiple pad .Transmitter Integrated Monitor and Management System (TIMMS) can be divided into three layers: real-time control layer, monitoring management layer and remote supervision layer. Real-time control layer is responsible for the transmitter data acquisition and real-time control. Monitoring management layer is composed by industrial computer, monitor software, data server and database composition. Monitoring software provides graphical interface, discard the traditional Windows menu interface form, adopt more concise and easy to operate the whole graphical partition navigation button interface. Remote supervision layer and monitoring management layer via Ethernet connected, through network communication technology and database technology acquisition pad field data.

This research aims to, on the basis of has completed real-time control layer and monitoring management layer of Transmitter Integrated Monitor and Management System (TIMMS), increases ranged supervisor namely Transmitter Station Remote Monitor System, make TIMMS have stronger stability, convenient maneuverability, higher reliability, and the immediate development for the system establishment interface environment.

2. Research Method
2.1. System Innovation
The Transmitter Station Remote Monitor System Based on B/S structure in the concrete realization has two innovation points:

One is that the system of integral logical structure adopts B/S structure of three-layer system, three layers of B/S structure relative to the two layers of C/S structure has a lot of advantages, including [3]:
1) B/S uses the IP network to realize remote data transmission, more generality and usability.
2) B/S can be structured in heterogeneous platform above, including the network heterogeneous, operating system and database epimerization.
3) B/S deployed in the server, the client browser can operate only by monitoring program, that makes the system deployment, maintenance and simpler.
4) The client use the browser running monitoring program can provide stronger maneuverability and interfacial friendly.

The other is that in the system software code realization, the page dynamic refresh of real-time monitoring and remote print adopted the Ajax technique.

Ajax technology makes that the communication quantity between the client and the server is greatly reduced. This has two reflection in the physical:

One is, when the page data update, client can need not update the entire page, just can update particular section which needs to (i.e. not need to refresh the entire page).

The other is lightened the burden of server, visited server is only so a few finite sets, but access action client is very much, it only need to send updated data into server, when the updated data was processed, server just return a result, by client analytical engine will can results into a Web page merges into the original page, do not need complete post back.

It using the client powerful computation resources, reduced the server burden, make sure that the server can carry more connected views. This could be a solution to the system monitoring page data frequent refresh and remote report form printing problems.

2.2. System Structure Design and Platform Choice
The Transmitter Station Remote Monitor System Based on B/S Structure is on the basis of has completed real-time control layer and monitoring management layer of Transmitter Integrated Monitor and Management System (TIMMS).

It has two big functions, namely monitoring function and management functions. In order to achieve this two big functions, system design by five modules, namely real-time monitoring module, user management module, the data recorded module, modify cipher module, exit module.

C/S and B/S in today's world is a technical architecture development mode of the two big mainstream technologies. In considering two technical system structure and the superiority of radio and television pad monitoring system of present situation, from cost and easily upgrades maintenance Angle, decided to the Transmitter Station Remote Monitor System adopts the B/S (is clicked/Server) structure, it adopted most B/S structure of three-layer structure: the presentation layer, business logic layer, data access layer.

2.3. System Key Technologies to Realize
In the system software code realization, the real-time monitoring page dynamic refresh and the remote print adopted the Ajax technique [4].
1) Page real-time refresh Based on Ajax technique
Currently the realization of applications based on Web have two different ways.

One is realization on A Web Server, will organize the results into static HTML document returns to the browser display after Completing execution, such as the ASP.Net, etc. If completely using this method programming, want to break a data must be refresh the entire

page, which have a strong sense of users, flashing made a very bad visual impact to client. In addition, some parts of the entire page are static changeless, no necessary to carry out their refresh, meanwhile the network channel waste too much [5].

Another kind is in the browser server, such as JAVA, JavaScript, etc. If completely using this method programming, the data extraction of the Web Server page is difficult. So must both combine to finish data real-time update.

Now this system uses Ajax technology to realize remote monitoring data real-time refresh were briefly introduced.

First add quoted a Ajax engine in WEB programs , in the system to add references are "AjaxPro "class library, then add in WEB configuration files.The configuration items that all the "[ajaxpro /*.Ashx]"request (namely from the client sends the Ajax request) were handed "[ajaxpro.AjaxHandlerFacto]" processing, rather than by default
"[System.Web.UI.PageHandlerFactory]" To deal with it.

When the system will start four thread respectively used to connect database A ,database B, database C and database D.

Four thread realized respectively to the four database connections, four thread reads the real-time data from each database table, the page will read the data stored in the Session "DataInfor" array. The launch pad real-time data monitoring pages (AllMonitor.aspx) will consisting of four data for a string "strParams" used by ";" Symbol. The page using "AjaxMethod "server-side method, the only different between it and ordinary server method is the place for it must want to add a "[AjaxPro.AjaxMethod]" in the above method .

Here we used "[Ajax. AjaxMethod()]"characteristics, tell framework in the client page produce this method "GetDataShow()"the corresponding javascript to asynchronous request.

Then in the client server using JavaScript calls "GetDataShow()"method, because receives the four pad data are connected together string, so in the client to use JavaScript will receive data string "STR" according to "," Symbols for four strings, each space separately single pad data string.

Each pad data string including the launch pad by all the parameters (including monitoring system of video frequency deviation and tone, output power, reflex, power and sound power, VSWR at etc) data, they were made '|' symbol connected together, so in real-time data display a page of the client to use '|' symbol will indicate a single pad data string separated, separated after data respectively show to each pad interface for monitoring of each physical quantities corresponding "Lable" controls.

For a single pad of real-time data display a page （LauncherMonitor.aspx, LauncherMonitor228.aspx, ModulParameter.aspx, ModulParameter228.aspx, ModulParameter.aspx, ModulParameter228.aspx, Just taken from each database of real-time data string with '|' symbol "strParams" separated by, then put the data shows to the corresponding "Lable" controls.

System every one seconds will go to read a database data, with Ajax technology to achieve the real-time system web refresh, and so every time data collection system after only refresh monitoring data in a Label controls page, won't refresh the entire page, so that the user interface for monitoring in watching when he doesn't feel pages in fast refresh. The whole process is as shown Figure 1.

2) Based on Web remote report form printing technology

In C/S mode real-time monitoring program in realizing monitoring information of automatic printing technology is easy, and B/S model of real-time monitoring program is due to its client browser, but requests the browser can like C/S mode real-time monitoring program would only print selected content, but not print used to control the navigation bar or command button, and in print without popup dialog box, i.e. not require the user to confirm, have certain difficulty. Comprehensive considering various factors, as well as to the user print requirement analysis, this system is still the comprehensive use of the Microsoft company provide XmlHTTP technology and asp.net technology and JavaScript technology (namely the Ajax technique) to realize the launch pad remote monitoring subsystem remote report preview printing function. With the above mentioned is same, first add "AjaxPro"class library, then in WEB forms page using" [Ajax. AjaxMethod ()]" characteristics. Shown above methods, the header footer Settings are through modifying registry to achieve, and the rest is primarily through the realization method "innerHTML" come to write content [6] [7].
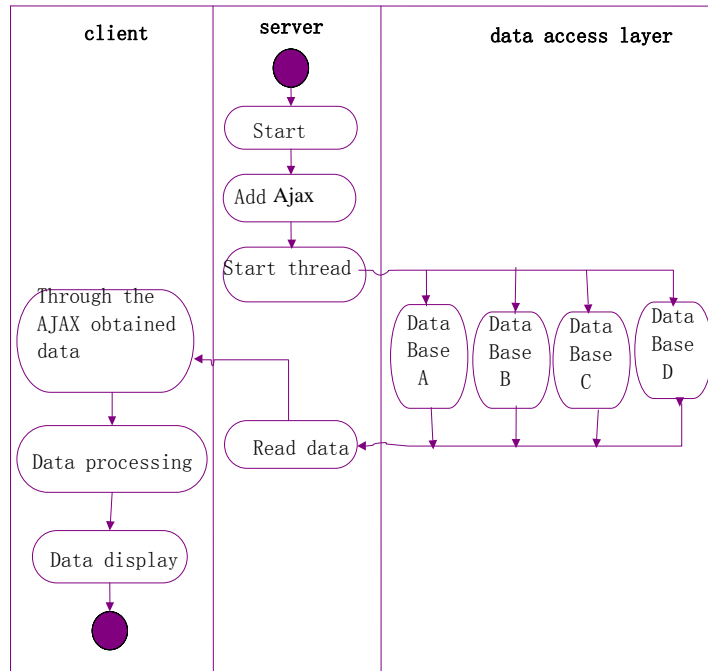
Figure 1. Ajax technique of web based on real-time update

The system uses Ajax technology to achieve the statements in print, is remote client through JavaScript set print generate reports style and function, thus solved the B/S structure under the print some problems, such as statements pagination, rich format design, page output, etc.

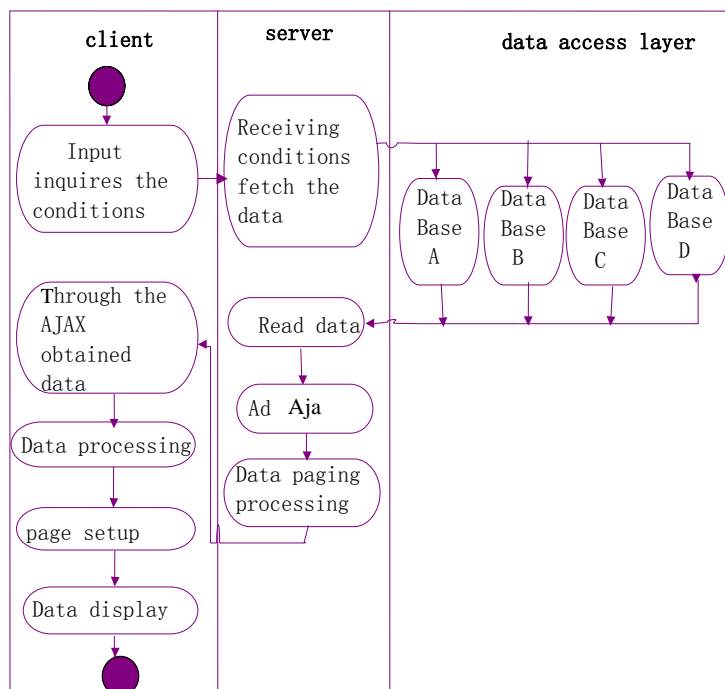Based on Web statements of printed specific flow in the following Figure 2 illustrates.

Figure 2. Based on Web statements remote print

3. Results and Analysis
3.1. Database Design

This subject adopts American Microsoft company of SQL relational database management system, so the Transmitter Station Remote Monitor System database design is based on SQL database [8].

The monitoring management layer of Transmitter Integrated Monitor and Management System (TIMMS) has configuration of the independent database for each pad. So the remote monitoring center set up five database, each database data is corresponding to the launch pad real-time database data synchronization mirror.

3.2. Web design program

Web design program mainly includes the presentation layer design, business logic layer design and data access layer design, and some key techniques of design and implementation [9] [10].

1)   The realization of the presentation layer

The Transmitter Station Remote Monitor System display interface is constitute by some Web form page, mainly divides into two parts, one part is for monitoring system of real-time data shows, the other part of the Web page form design is mainly for management and service of remote monitoring system. Monitor interface display, to realize dynamic display of the transmitter parameters of the launch pad , dynamic display of the status information of the launch pad ,dynamic display of the system time and dynamic display of the fault alarm function. This system real-time data display adopted "Dundas Gauge for.net" dials display technology. The entire page using the three frame structure, it consists of three page composition (bottom.aspx, left.aspx, workspace.aspx). Monitoring system main interface (real-time monitoring interface) as shown in Figure 3.
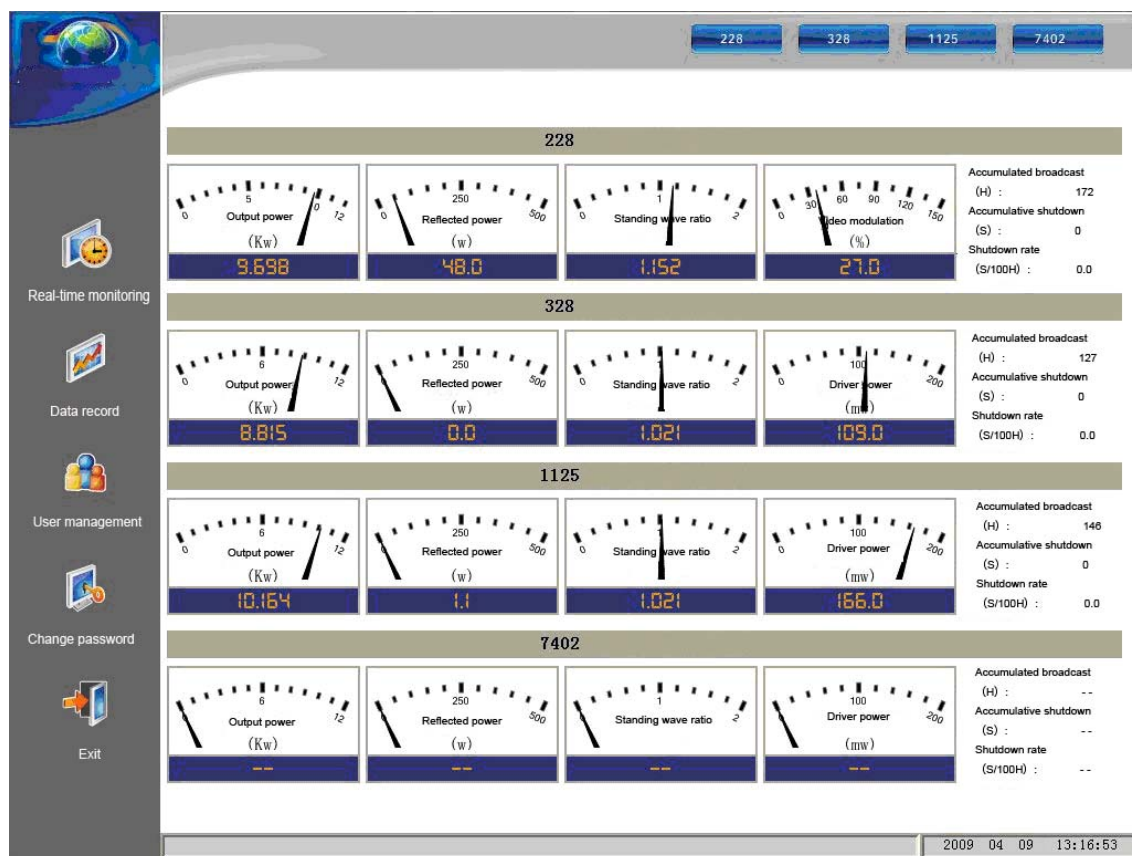

Figure 3. Monitoring system main interface (real-time monitoring interface)

2) Business logic layer realization

Business logic layer of this system is mainly used in the realization of the key technology and database query display. For the database data query basically has two parts, one is query to transmitter parameters and status information of launch pad, the other is query to duty personnel and duty log queries of the launch pad.

3) The data access layer realization

In the Transmitter Station Remote Monitor System all access database logic are made by the Web services in the data access layer to fulfill. In this way the data access logic of the Transmitter Station Remote Monitor System comes out independently, so the program code can separately written and debugging. This way greatly reduced the burden of the Web server, convenient to debug and development, which has greatly enhanced the whole system efficiency of the development and actual operation efficiency, make logic layer clearer, division more reasonable.

4. Conclusion

The Transmitter Station Remote Monitor System has been operation somewhere. The system is stable and reliable running, fully realize the design goal, to alleviate attendant's working intensity, improve program signal safety and quality broadcast rate. With rapid development of networks, development based on B/S model of radio and television pad remote monitoring system has broad prospects, it will also for other industries of remote monitoring system has a far-reaching influence. This system not only adopted software engineering technology and computer measurement and control technology, and also adopted the Web technology, Internet browser technology, makes the distance network management and real-time monitoring system networking combine to make the competent leadership and related departments at various levels conveniently remote access real-time monitoring system, share real-time data and image information, be helpful for accurately and rapidly masters, decision making, improve the level of management and work efficiency.

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