

A Mechanism of Initiative Transmission to Send Message on WEBGIS

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Abstract: The paper researched and realized the initiative message transmission mechanism of WEBGIS server based on the N layer architecture of Internet. According to WEBGIS application long business operation as well as server information visualized in client side in real-time features, this article uses the Socket communication and the client side with JAVA Applet to realize that the WEB server can send message initiative to the client. It comes up and realizes a concrete plan of initiative transmission mechanism in WEBGIS. We run the realization plan based on Winsock through the project practice of Guangzhou cable TV network security monitoring and alarm system. The system operation has been verified in system running. The combination of this mechanism with conventional WEBGIS can greatly improve the performance and the usability of WEBGIS.

Keywords: WEBGIS, message, initiative transmission

1. Introduction

With the development of Internet technology and the rising demand of GIS, using Internet publish spatial data on the Web and providing spatial data browsing, query and analysis capabilities have become the trend of GIS development. Furthermore, WEBGIS and controlling system, mobile location service and real time information exchange are more and more closely connected. It is estimated that 80% information are connected with location. It often costs lots of effort in searching some person or place. To improve the efficiency, location information has become very important for people. With the development of industrial automation, WEBGIS is also used in real time controlling system, which challenges traditional information exchange methods and also proposes higher demands of real-time, security, and timeliness of information exchange in WEBGIS.

At present, WEBGIS can support the GIS functions in Internet very well. In addition to basic display and query functions, many long transaction operations are supported, such as spatial analysis. Because of the disadvantage of HTTP protocol, WEB server can only passively provide information browsing and can't send re-

quest to client initiative. This determines the insufficient support of long transaction operation in general WEBGIS. WEBGIS is a development trend of GIS, which can display GIS functions in Internet. Besides common map operations, WEBGIS provides various ¹basic graphic operations, such as, bus transfer, geographical names information, guiding services, etc. There are two interactive methods from client and server sides,

1) Client side request, server side receive and process and sending back result to client side. This method is often used in basic map operations, such as, zooming, roaming, etc.

2) Client side request, server side accept the request and send back the valid data to client side, the client side will process data timely and display. This method is mainly used in part process of spatial analysis.

Most of client exchange system of WEBGIS is relatively passive. Only when client proposes the request, WEBGIS server will respond to the request, process data, and send the result to client side, then users can browse the result graphs or data in browser. For example, if users want to find the transport routes from place A to place B, after entering a query condition, the information will be send to the server side after processing, server will process the information accordingly and get the relevant information from database and the information will be send back to client side. Client side will display the relevant information in text or graphs vividly.

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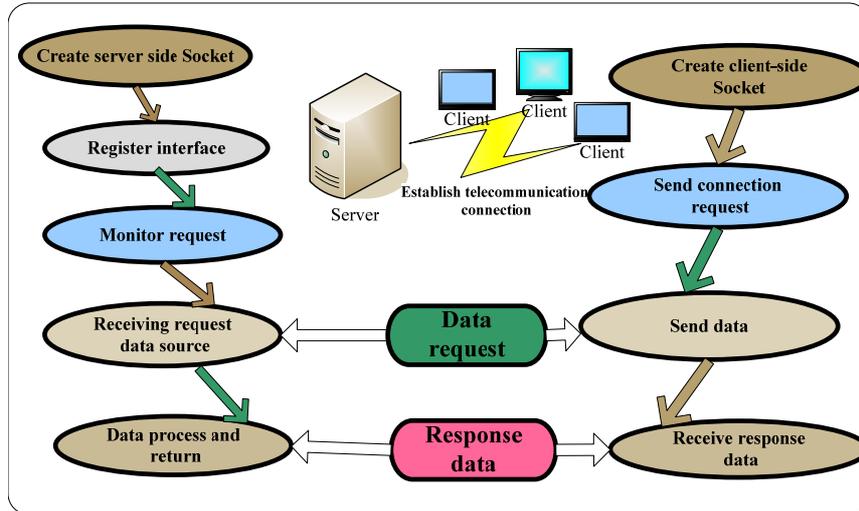


Figure 1. Workflow diagram

2. Propose of Initiative Transmission Message Sending on WEBGIS

Users only need to operate through browsers in existing interactive method which makes WEBGIS accepted by the public. There is one similarity in client interactive operation, that is, one request and one result received. It can't keep the connection with server which reduces the timelessness of WEBGIS.

With the development of technologies, such as communications, GIS and GPS, WEBGIS has got great progress these years. Users are not satisfied with the simple map browsing, and they are more interested in the real-time geological data. If users want to know the exact location by mobile phone or wireless network when using the current WEBGIS interactive approach, firstly, users need to send a request, and the server can only reply one present or out-dated location information to users one time. If the users want to get the constant real-time location information, they have to send the request continuously. This approach is increased burden of users, and a better solution should be proposed.

When using the HTTP protocol, the connection of server and client will disconnect after a communication. To improve the communication method, this paper proposes using Socket communication approach in research and realization of initiative message sending mechanism. In the communication process of user and server, the server can send the real time information to user and receive the request from user timely. The combination of this mechanism with conventional WEBGIS can make the WEBGIS better developed.

The mobile communication and internet are two hotspots of information industry, the combination of them leads to the mobile wireless internet application, and it will be the important development direction of informa-

tion industry. China has the biggest mobile phone users group for years, the value added service of mobile phone based WEBGIS will be popular in many areas, such as travel, transportation, medical treatment and police. It will be a very important part of people.

The development of spatial position technology and mobile communication technology makes fast information transformation be possible. Driven by market and technology, LBS (location based service) development very quickly, and with the help of mobile terminal and wireless network, it will determine the exact location and provide all the location information to users. LBS have become a hot academic research area.

LBS ensures the future of spatial information service and blueprint of mobile position service, that is, when users interact with a model of real world, this model can dynamically provide different information to various users in different time and place. When the mobile users interact with this model, the view of user's will change with different users' role and environment [4]. Spatial information technology, especially the development and integration of GIS, GPS, RS, VR and computer graphics shorten the distance of spatial information and people's lives. The development of mobile service can match the requirement of further socialization and popularization of spatial information.

The combination of initiative sending message mechanism and WEBGIS meets the requirement of real time communication requirement of LBS, which plays the linking role. The initiative sending message mechanism uses stream socket approach in TCP protocol which ensures information accurately sending and its integrity and security.

The main purpose of this paper is to provide a solution to realize Web Server initiative transmission to send message to client side on WEBGIS.

3. Key Technology for Initiative Sending Message Mechanism

Based on the Initiative sending message mechanism system of this paper, the server-side program is developed in Visual C++ and the client-side is developed in Java. The following introduction is the of Socket communication of Visual C++ and Java. The working mechanism of Applet and Socket are similar with typical client server. The server will connect third part server, so we uses the Visual C++, and client uses Java Applet. The working steps of Applet and Socket are as follows.

The server needs to establish a socket for monitoring, after allocating port for the socket, a new client monitoring thread will be established. Client side establishes socket for connecting servers, then call function to request the connection with server. After receiving the request monitored from client socket, server will allocate receiving function to establish a connecting socket; the transfer the data between the server and client-browser by the sockets of server and client. The Server will send the result data after processing to client; Client Applet will process data and display the data in browser; at the same time, Applet will send the control instructions of client to server, according to the corresponding control strategies, the server will instruct inputting port of data connection controlling card change operation status of controlled object; in the end, client server close socket, and the server will use close function to disconnect the Applet connected socket.

4. Initiative Sending Message Mechanism Design

4.1. Design of Server-side

When received the connect request form client-side, the primary server will creates threads to ensure independent connection to multi-client side. To ensure data accuracy, each thread will send different request to third party server according to different needs for different data. If user wants to get current location information, the primary server will only send result data to user for one time; after user receives the information, probably the connection is not closed, but user still needs to send request for more service. If the user want to know the transportation route, when user send request to primary server, the primary server will interact with the third party server, then the third party sever will send information of route to primary server in certain time interval; the primary server will send the information to user. This is the purpose of the primary server in initiative sending message mechanism.

Multi-threading is to establish communication between multi-clients. To receive information from the client side timely, and send data to client timely, we use two

nested loop. One is for receiving real time user information, the second one is for real time sending information and accept third party server data; identify users' requirements to select sending approach.

The primary sever side design should ensure the following orders, a) to ensure the effective connection of multi client-side. b) receive client-side data timely and effectively. c) transfer information from the third party accurately and timely. d) when the primary server side are connected with the client side, it can receive the upload information from client side and send information to client side freely. e) receive information from the third party sever, and feed back to client timely. f) inform user timely when the third party server shutdown

The following diagram illustrates the workflow of server side. Socket communication is only methods we using. A more specific solution needs to be provide for specific operation process. Figure 2 is the main workflow of server side.

4.2. Design of Client-Side

After client-side Socket established, users choose required services. According to the types of services, client-side will send service request to server. Since the long time receiving data will occupy the main tread, in order not to affect the WEBGIS basic graph operation, a sub-thread needs to be established to take charge of data reception. Since the data reception process is not continuous, several loop receive mechanism needs to be established to ensure data accuracy and data reception.

The client-side should realize the following functions, a) start the connection program with the primary server at any time, and also terminate the communication with server. b) timely inform user if there is any exception in communication process. c) user can freely carry out client side operation in the course of communication, such as, graph zooming, roaming, etc. d) receive data information from primary server. e) identify whether the primary server is shutdown, and send back the abnormal result to user.

If user wants to get the needed data, the first step is to start the connection with the primary server. The communication between the client-side and server is through Socket. It's necessary to establish Socket communication mechanism.

5. Specific Realization and Application

The detailed initiative message sending mechanism technology in WEBGIS has been introduced above, and the internet communication program development on Windows system is also mentioned. The following introduction is about the remote controlling software platform on TCP / IP-protocol, Guangzhou CATV Network security monitoring alarm system.

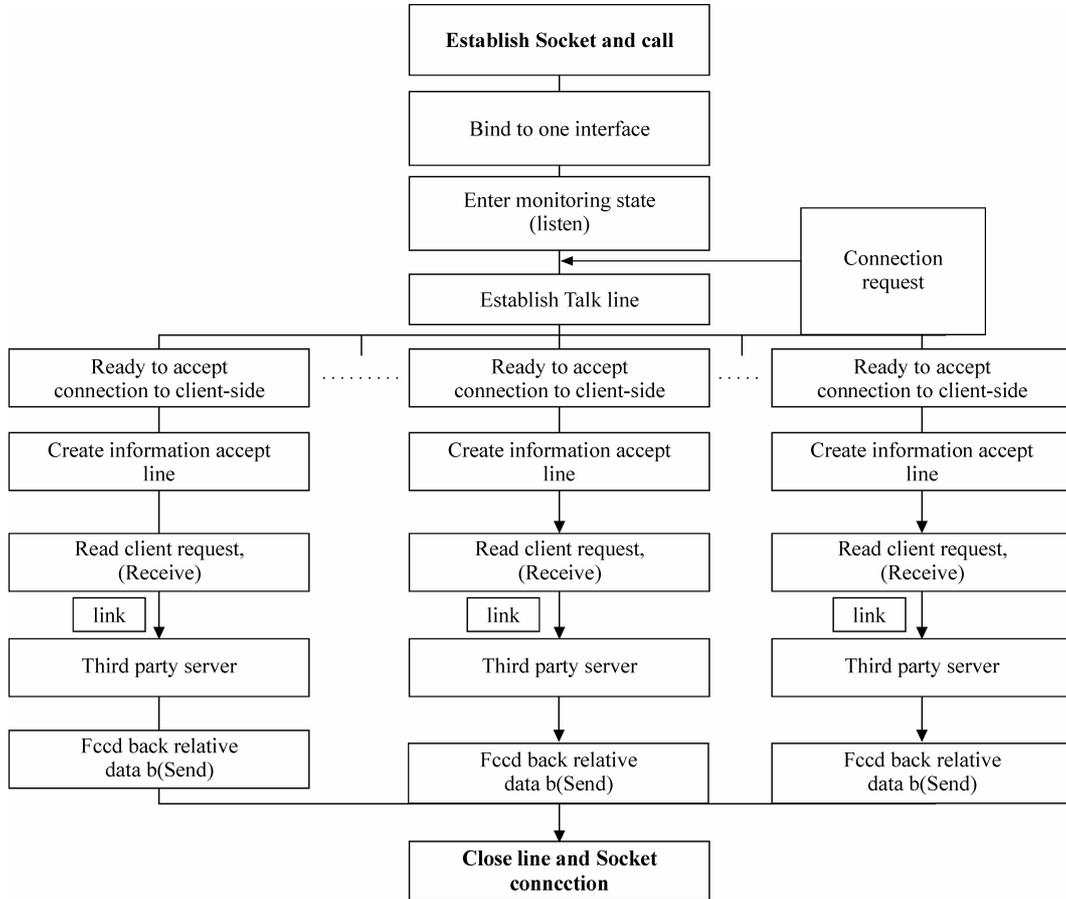


Figure 2. Workflow diagram on server

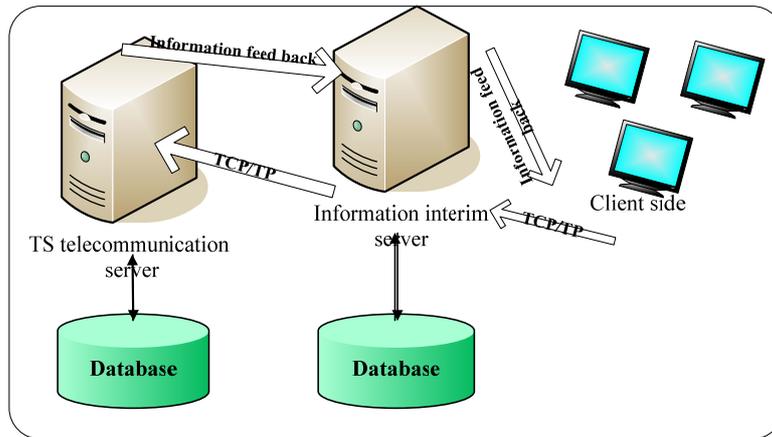


Figure 3. Monitoring and warning system structure diagram

Figure 3 is the diagram of remote controlling software platform on TCP / IP-protocol.

The main function of Ts communications servers are, communication with information interim server, log management, server address setting, GSM port settings, etc. The communication between Ts communication ser-

ver and information interim server adopts Socket. Information transfer server is designed in Visual C++ to realize the real-time message receiving and sending. It also can save and distinguish the connected client side, and save all the client side landing information; set port and IP of communication interface and ensure the usability of

real time communication port.

After receiving message from Ts communication server, transfer sever will analyze the message according to the "GIS Communications News norm" and get the type of message. When received the alarm information, it will parse out the alarm monitoring machine number, alarm time, alarm type, alarm channels, etc; the alarm data table and history alarm data table will be written; when received discharge alarm message, all the information in the alarm data table will be deleted; it will also inform user to update the information.

6. Conclusion

This paper discussed key technology of network communication and proposed the detailed program on realization of initiative message sending mechanism on WEBGIS. The Guangzhou CATV Network security monitoring alarm system is designed based on Winsock which has proved the feasibility of this program.

This paper has discussed the following from theory and practice two aspects.

1) specifically introduce application and development trend of WEBGIS. The combination of initiative message sending mechanism and conventional WEBGIS will foster WEBGIS development.

2) explain specifically the principles of socket communication mechanism, as well as the implementation process of communication.

3) specifically analyze the framework and workflow of initiative message sending mechanism on WEBGIS, and also propose detailed design program.

4) realize coding of initiative message sending mechanism server and client side server, which ensures information timely exchange.

5) successfully apply the research to practical project.

Due to time limits, this paper only studied the initiative message sending mechanism and simulated information interactive process. As to how to integrate to the conventional WEBGIS, and display it in digital maps hasn't been realized yet. Furthermore, data transmission doesn't involve complex data transmission security

problem, so it has deficiency in data security. All of above problems are the key filed that needs to improvement in the near future. With relevant technology development, we fully believe that WEBGIS will do better.

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