



166166

1

16 JAN 2003

COMPUTER NETWORK AND SERVER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a computer network consisting of many clients and servers, and to the structure of the server itself.

This application is based on Patent Application No. Hei 10-202211, filed in Japan, the contents of which are incorporated herein by reference.

2. Description of the Related Art

In a computer network, when a client and a server communicate with each other, they must know in advance communication path establishment information (or system information) such as each destination address or the like. Therefore, in the client side, the address (or location) of each relevant server must be defined in advance, and also in the server side, establishment information such as the number of clients and the address of each client must be stored.

In conventional computer networks, the clients and servers are provided in a closed network, and the number of the clients is not very large. Therefore, the number of clients and the address of each client are clearly known in such a system, and the pre-definition of the establishment information can be performed with no problem. However, recently, the Web computer system, the mobile computer system, and the distributed OT (object transaction) technique have become popular, and an unlimited number of Web clients may connect to any Web server. Such a situation may cause the following problems.



G00002

16 JAN 2003

The first problem is that the number of the clients enormously increases because an unlimited number of Web clients connect to each Web server. In such a situation, it is impossible in practice to define the client information in each server side in advance, and to set up in advance a communication agent program executed in the client side and relevant establishment information.

Here, a client cannot access a desired client if the client does not have the address of the server; thus, each client should know the addresses of every server. The second problem is that it is very difficult to know and manage the addresses of every Web server because many Web servers are widely dispersed.

In consideration of the above problem, there is a need to provide a computer network and a server of a network communication managing system for solving the above problems even if the number of the clients and servers increases enormously.

SUMMARY

An aspect of the present invention provides a server comprising a communication manager for receiving a connection request from a client, generating establishment information on a communication path between the server and the client according to the connection request, transferring the establishment information and a communication managing agent to the client, and establishing the communication path between the server and the communication managing agent transferred to the client.

Accordingly, the server does not need to store communication path establishment information relating to each client in advance; thus, it is possible to greatly reduce the time necessary for storing such establishment information data of the relevant network.

Another aspect of the present invention provides a computer network comprising at least one

16 JAN 2003

server and at least one client, wherein:

each server has a communication manager which receives a connection request from a client, generates establishment information on a communication path between the server and the client according to the connection request, and transfers the establishment information and a communication managing agent to the client, and

In the client, the communication managing agent establishes the communication path between the communication managing agent and the communication manager based on the establishment information transferred from the server so as to execute communication with the server.

Accordingly, it is unnecessary to set up such a communication managing agent in the client side in advance. In addition, as the establishment information necessary for communication is transferred from the communication manager to the client, it is unnecessary to define such establishment information in the client in advance. It is also easy to connect the client to a communication manager operating in a computer other than that functioning as the above-mentioned server (which received the connection request). In addition, in the above structure, the client does not need to possess the state of the communication path, and to observe the system-switching operation of the server, the path-routing operation due to a network problem, or the like. Therefore, when a client wants to communicate with a server, the client only has to issue a relevant communication request to the communication managing agent.

In the above computer network, the communication manager may select an execution module of the communication managing agent suitable for the client, based on platform information included in the connection request, and transfer the selected execution module.

Accordingly, this computer network can include clients employing various

10 JAN 2003

kinds of computers, and a communication path can be reliably established between the relevant communication manager and communication managing agent.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing the functional structure of an embodiment according to the present invention.

Fig. 2 is a communication sequence chart showing the operations of the embodiment.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Hereinafter, an embodiment of the computer network and the server according to the present invention will be explained with reference to the drawings.

Fig. 1 is a block diagram explaining a functional structure relating to the present embodiment. In this figure, reference numerals 1 and 2 indicate Web servers and reference numeral 3 indicates a Web client, and the Web servers 1 and 2 and the Web client 3 are connected with each other via communication line 4. The Web server 1 comprises communication manager 1a and Web server AP (here, "AP" corresponds to an application program) 1b, while the Web server 2 comprises communication manager 2a and Web server AP (i.e., application program) 2b. The Web client 3 comprises communication managing agent 3a and Web client AP (i.e., application program) 3b.

The communication manager 1a comprises establishment information managing section 1c, connection request receiving section 1d, agent and establishment information transfer managing section 1e, and protocol control section 1f. The communication manager 2a comprises establishment information managing section 2c, connection request receiving section 2d, agent and establishment information transfer

managing section 2e, and protocol control section 2f. That is, the communication managers 1a and 2a have almost the same structure; thus, the function of each structural element of the communication manager 1a will be explained as a representative, below. In addition, the communication managing agent 3a comprises protocol control section 3c and establishment information file 3d.

The connection request receiving section 1d has a function of always receiving a connection request from Web client 3 (that is, a request from any Web client 3), and a function of informing the establishment information managing section 1c of the received connection request. The establishment information managing section 1c has a function of generating communication path establishment information with respect to such a connection request from Web client 3, and a function of managing communication path establishment information data which were previously generated.

The agent and establishment information transfer managing section 1e has a function of selecting a communication managing agent 3a suitable for the Web client 3 and transferring an execution module of the agent 3a and the above (communication path) establishment information to the Web client 3, and a function of activating the communication managing agent 3a of the Web client 3 via a remote access. Here, various kinds of communication managing agents and their execution modules are stored in the managing section 1e in advance. The protocol control section 1f establishes a communication path between the Web server 1 and the communication managing agent 3a of the Web client 3 so as to execute communication between the Web client 3 and the Web server 1.

The protocol control section 3c in the communication managing agent 3a has a function of establishing a communication path between the agent and communication manager 1a or 2a so as to execute communication between the Web client 3 and the Web

server 1 or 2. The establishment information file 3d is a file in which communication path establishment information data received from the Web servers 1 and 2 are stored (as explained later).

Hereinafter, operations of the present embodiment will be explained in detail with reference to Fig. 2.

If Web client 3 wants to connect to Web server 1, the relevant connection request is received by connection request receiving section 1d in communication manager 1a. The connection request receiving section 1d acquires address information (such as the IP address) of the Web client 3 according to the connection request, and transfers the acquired information to the establishment information managing section 1c.

The establishment information managing section 1c generates communication path establishment information suitable for Web client 3 according to the relevant address information. The establishment information managing section 1c stores this communication path establishment information in an establishment information file and the stored information is used when a connection request from the Web client 3 is received again. As explained above, once a connection request is received from Web client 3, the communication path establishment information relating to the Web client 3 is stored by the establishment information managing section 1c. When a connection request is received from another Web client (not shown), similar operations are performed.

When the communication path establishment information relating to the Web client 3 is generated as described above, the agent and establishment information transfer managing section 1e selects an execution module of a communication managing agent 3a suitable for the Web client 3 which issued the relevant connection request. The managing section 1e then transfers the selected module and the establishment

information to the Web client 3, and executes this communication managing agent 3a in the Web client 3 via remote access. Here, the selection of the execution module is performed based on, for example, platform information on the computer functioning as the Web client 3a, the information being received together with the connection request.

When the communication managing agent 3a is activated as explained above, the protocol control section 3c in the agent 3a establishes a communication path between the agent 3a and the communication manager 1a based on the establishment information which was transferred together with the communication managing agent 3a from the Web server 1. Once the communication path between the Web client 3 and the Web server 1 is established, the protocol control section 1f in the communication manager 1a and the protocol control section 3c in the communication managing agent 3a maintain the established communication path and execute operations necessary for the communication between the Web client 3 and Web server 1.

The communication managing agent 3a stores the establishment information transferred from the Web server 1 in establishment information file 3d. When the Web client 3 accesses the Web server 1 again, operations necessary for the communication of the Web client 3 are performed by the communication managing agent 3a. In this case, the Web client 3 accesses the communication manager 1a via the communication managing agent 3a; thus, a necessary communication path can be easily established based on the establishment information which has been already stored in the establishment information managing section 1c. In addition, the communication managing agent 3a can also easily establish the communication path with the communication manager 1a based on the establishment information filed in the establishment information file 3d.

Similar operations for establishing a communication path are performed

between the Web client 3 and the Web server 2. That is, when the Web client 3 communicates with the Web server 2, a communication path is established between the communication managing agent 3a in the Web client 3 and the communication manager 2a by performing operations similar to those described above.

5 As explained above, according to the present embodiment, the establishment information data (necessary for establishing each communication path) based on actual communication performances are gradually stored in the Web servers 1 and 2 and web client 3. Therefore, it is unnecessary to store establishment information data in advance in the Web servers 1 and 2 and web client 3. Accordingly, even if an
10 enormous number of Web servers (such as servers 1 and 2) and Web clients (such as client 3) exist in the network, communication between any Web server and any Web client can be reliably performed.

The present invention is not limited to the above embodiment, but the following variation is also possible. In the above embodiment, a "push-type" transfer operation is
15 adopted in which the agent and establishment information transfer managing section 1e takes the initiative in the operation of transferring and activating the communication managing agent 3a to the Web client 3. However, a "pull-type" transfer operation may be used, in which the operation of transferring and activating the communication managing agent 3a to the Web client 3 is performed according to a request from Web
20 client 3.

16 JAN 2003

What is claimed is:

1. A server comprising:

a communication manager for receiving a connection request from a client, generating establishment information on a communication path between the server and the client according to the connection request, transferring the establishment information and a communication managing agent to the client, and establishing the communication path between the server and the communication managing agent transferred to the client.

2. A computer network comprising at least one server and at least one client, wherein:

each server has a communication manager which receives a connection request from a client, generates establishment information on a communication path between the server and the client according to the connection request, and transfers the establishment information and a communication managing agent to the client, and

in the client, the communication managing agent establishes the communication path between the communication managing agent and the communication manager based on the establishment information transferred from the server so as to execute communication with the server.

3. A computer network as claimed in claim 2, wherein the communication manager selects an execution module of the communication managing agent suitable for the client, based on platform information included in the connection request, and transfers the selected execution module.