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# United States Patent [19]

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[54] **MANAGEMENT-DATA-GATHERING SYSTEM FOR GATHERING ON CLIENTS AND SERVERS DATA REGARDING INTERACTIONS BETWEEN THE SERVERS, THE CLIENTS, AND USERS OF THE CLIENTS DURING REAL USE OF A NETWORK OF CLIENTS AND SERVERS**

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[51] Int. Cl.<sup>6</sup> ..... **G06F 11/34**

[52] U.S. Cl. .... **395/200.54; 395/200.59**

[58] **Field of Search** ..... **395/200.01, 200.05, 395/200.03, 200.08, 200.09, 200.12, 610, 615, 182.02, 182.18, 184.01, 200.31, 200.33, 200.49, 200.53, 200.54, 200.56, 200.57, 200.58, 200.59**

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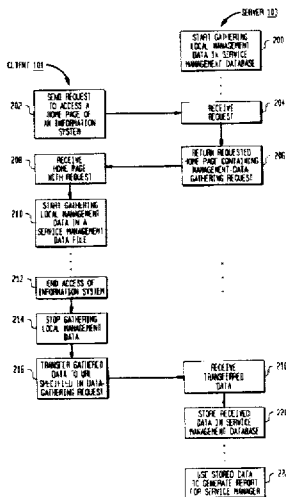
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[57] **ABSTRACT**

In an information network of clients (101-102) and servers (103-104), a service management system (122) of a server gathers data from the server and from the clients for managing an information service. Information management data is gathered on a client by extensions (131) to a browser (130) and is periodically reported to the service management system. Data gathered on the server includes: number of page accesses per unit of time, durations of delays between receipt of client requests for information and the server responses thereto, number of accesses to each accessed page from each referring page, number of page accesses per browser type, processor and mass-storage occupancy of the server, and configuration details of each accessing browser. Data gathered on the client includes: durations of delays between the client placing a request and a server's response to the request, the amount of time that a particular object is active at the client, abandon count and time, click-ahead count and time, and client demographics. The service management system uses the gathered data to generate reports for a manager of the information service.

**18 Claims, 2 Drawing Sheets**



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FIG. 1

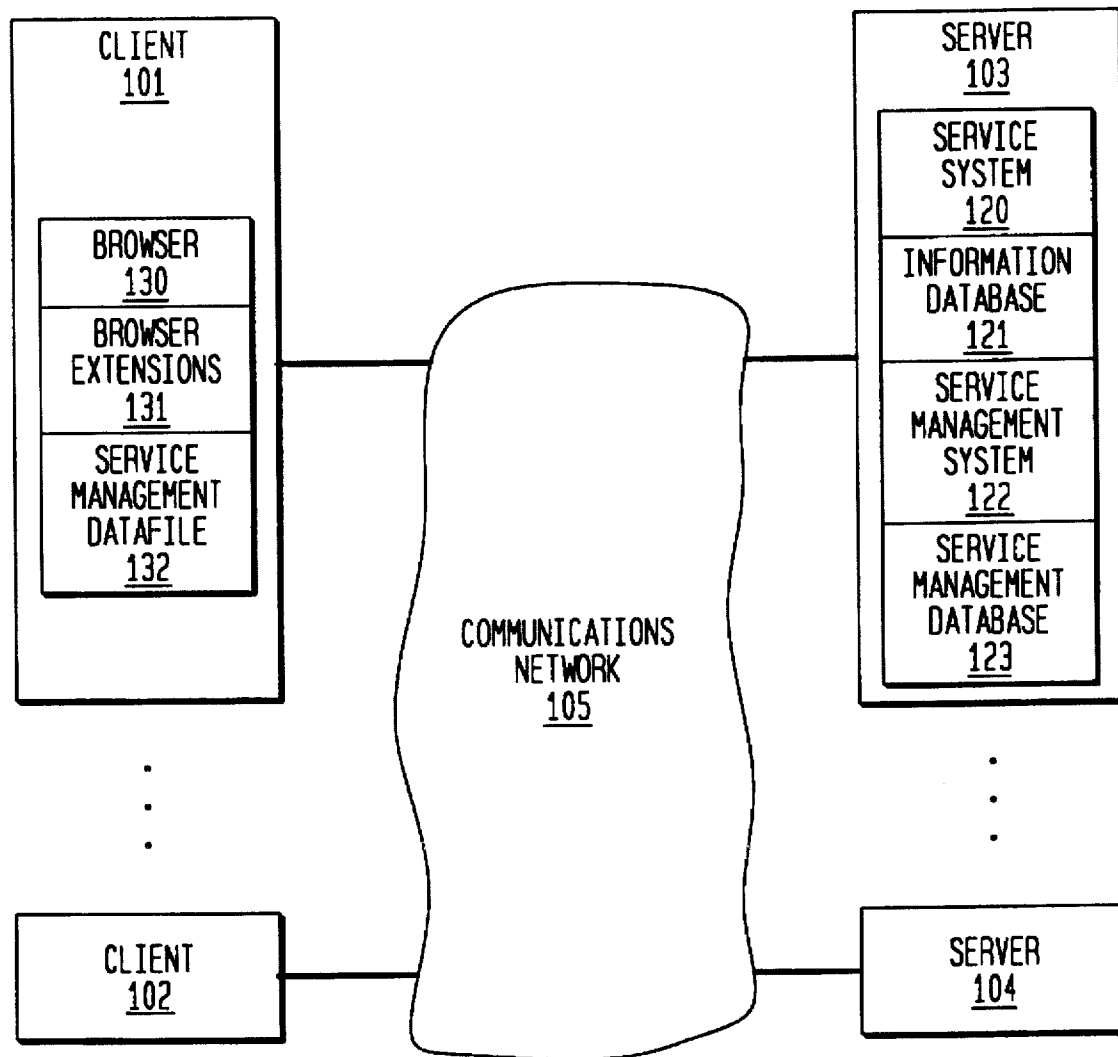
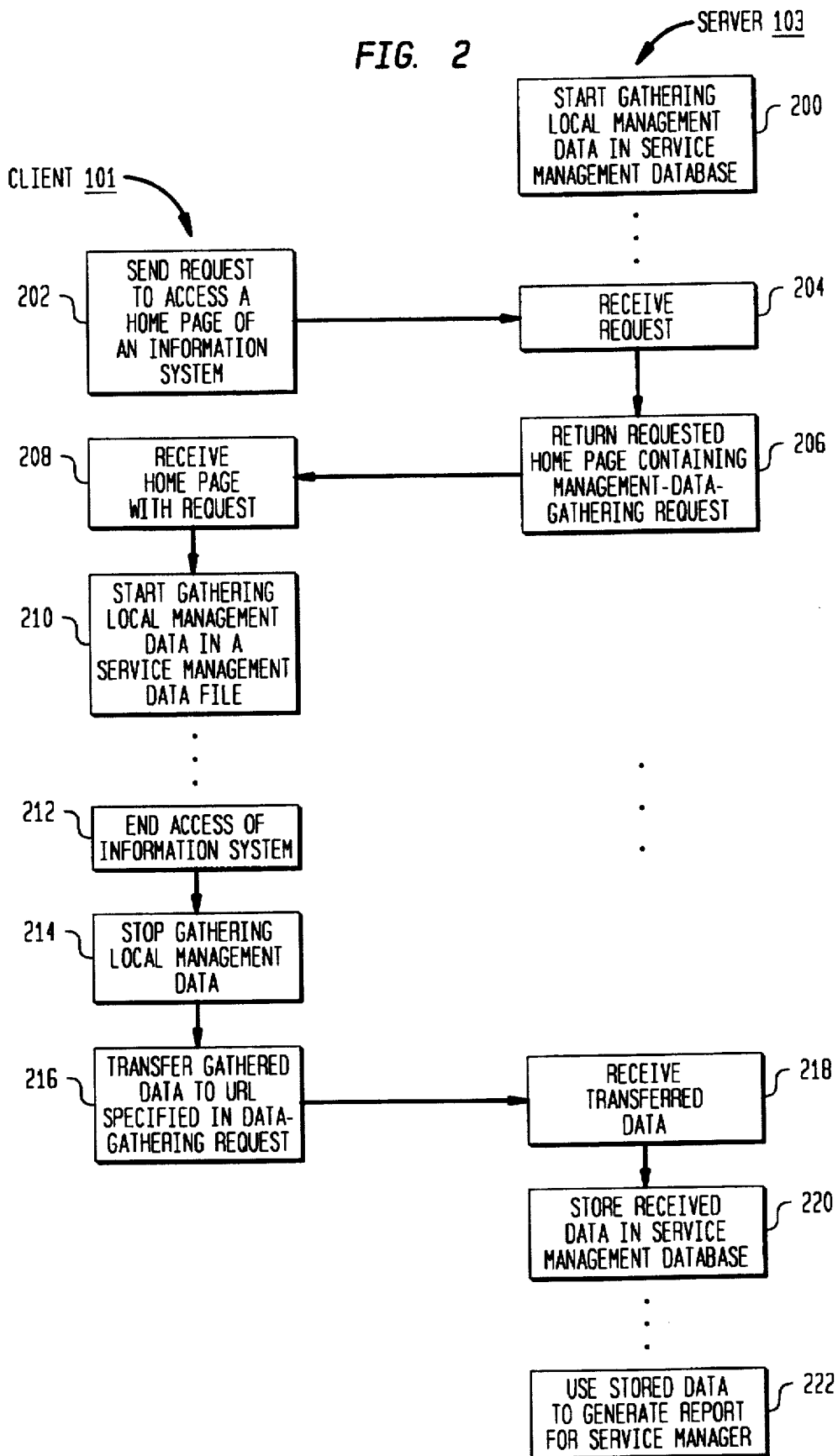


FIG. 2



**MANAGEMENT-DATA-GATHERING  
SYSTEM FOR GATHERING ON CLIENTS  
AND SERVERS DATA REGARDING  
INTERACTIONS BETWEEN THE SERVERS,  
THE CLIENTS, AND USERS OF THE  
CLIENTS DURING REAL USE OF A  
NETWORK OF CLIENTS AND SERVERS**

**TECHNICAL FIELD**

This invention relates to information networks and to management systems for such networks.

**BACKGROUND OF THE INVENTION**

In an information network, such as the Internet, user's computers, referred to as clients, request information from information-providers' computers, referred to as servers, and the servers supply the requested information to the clients. In the World Wide Web (WWW), which is a de-facto standard for storing, finding, and transferring information on the Internet, the information is supplied in the form of pages. A page is a display screen-full of information expressed in textual, graphical, scriptural, and/or other form. A page comprises one or more information objects. An object is an information element that has its own network address—preferably a unique single address—called a URL (Uniform Resource Locator). For example, a page may comprise one or more text objects, one or more picture objects, and one or more script objects that are presented on the display screen in a layout defined by a frame object.

Typically, a server has a main page that serves as the entry point to the information and services that the server provides. This page typically points to other pages and to objects (e.g., graphic images, video/audio/text files, etc.), which are served either by the same server or by other servers.

An information service that is offered via the information network needs to be tuned for optimum performance. The demand for the service generally varies over time (e.g., weekdays vs. weekends, days vs. evenings, seasonally, etc.). In order to manage the service to optimally meet the customer demand, the service provider needs present as well as historical metrics that describe the quality or availability of the service as perceived by the customer. Also, an information service is often used at least in part for advertising. In order to make their advertisements most effective, advertisers need measurements on how many customers and what types of customers actually view their advertisements and for how long. Advertisers also like to know the demographics of their customers so that they can ensure that the advertisements are reaching desired targets.

To meet demands for service-management information in call centers, call management systems (CMSs) collect call-based statistics, archive them for reference, and generate reports therefrom. Also, Internet servers typically collect statistics such as the numbers of accesses ("hits") per page, and perhaps some other server-based statistics as well. But because call centers handle live calls and rely on human agents to handle the calls, the types of statistics that are collected by CMSs are often either not relevant to, or not sufficiently complete for, automated information networks such as the Internet. And the statistics that are collected by known Web servers are only server-based, rudimentary, and incomplete. Hence, what the information-network art needs in order to better manage such networks is a better management-data collection system.

**SUMMARY OF THE INVENTION**

This invention is directed to meeting the needs and solving the problems of the art. According to one aspect of

the invention, an information-service management system for a client-server information network gathers specific service-management data that are related to interactions between at least one client and at least one server. Data gathered on the server illustratively include at least two of the following: page accesses per unit of time, delay between receipt of client request for information and the supplying of the requested information, number of accesses to a page accessed by the client from each referring page, a number of page units per type of the client's browser, occupancy of a processing unit and a mass storage unit of the server machine, and configuration data of the client's browser. The gathered data are preferably used to generate reports for a manager of the information service to enable the manager to better understand customer needs and responsiveness of the service and to tune the service for optimum performance.

According to another aspect of the invention, the information-service management system gathers service-management data not only from the server, but also from the client. The data is gathered on the client by a management data-gathering arrangement such as extensions to the client's browser. The extension software may either be included in the client along with the browser software, or may be supplied to the client along with a data-gathering request. The arrangement periodically reports the gathered data to the information-service management system. Data gathered on the client illustratively include at least one of the following: delay between the client requesting information and receiving the requested information, an amount of time that an object of the supplied information is active on the client, an abandon count and time of an object of the supplied information on the client, a click-ahead count and time of an object of the supplied information on the client, and demographics of a user of the client. The data gathered on the client is preferably used to supplement and improve the data gathered on the server; the latter data may be incomplete or even misleading. Therefore, gathering data on both the client and the server presents the service manager with a better picture of service performance and allows the service manager to better manage the service.

These and other advantages and features of the invention will become more clear from the following description of an illustrative embodiment of the invention taken together with the drawing.

**BRIEF DESCRIPTION OF THE DRAWING**

FIG. 1 is a block diagram of an information network that implements an illustrative embodiment of the invention; and

FIG. 2 is a flow diagram of invention-related functions performed by a client and a server of the information network of FIG. 1.

**DETAILED DESCRIPTION**

FIG. 1 shows an information network that includes an illustrative embodiment of the invention. The information network includes a plurality of client terminals, computers, or other machines referred to generically as clients 101-102, that are interconnected with one or more server computers, systems, or other machines referred to generically as servers 103-104, by a communications network 105. Communications network 105 illustratively comprises the Internet backbone network, Internet gateways and associated intranets, etc., that are collectively generally referred to as the Internet. Units 101-105 together implement the World Wide Web, in a manner well known in the art. Each server 103-104 includes an information database 121, and a service system

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