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(54) **SIMULATED LOW-BANDWIDTH CONNECTION**

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See application file for complete search history.

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(57) **ABSTRACT**

A method of simulating a low-bandwidth connection over a higher-bandwidth connection. According to the method, data is received from a first device at a first predetermined speed, and the data is transferred to a second device over the high-bandwidth connection at a second predetermined speed. The second predetermined speed is less than the first predetermined speed and less than the speed of the high-bandwidth connection. In one preferred method, the data is transferred over a high-bandwidth LAN and the second predetermined speed is the speed of a modem connection. A computer system is also provided. The computer system includes a first device, a second device, and a speed control layer. The speed control layer is coupled between the first and second devices, and slows data transfer from the first device to the second device over a connection to a first predetermined speed that is less than the normal speed of the connection. In a preferred embodiment, the speed control layer includes an interface that is used to set the first predetermined speed.

24 Claims, 2 Drawing Sheets
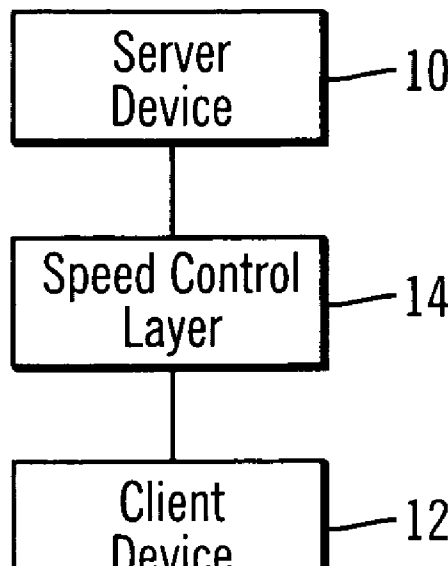
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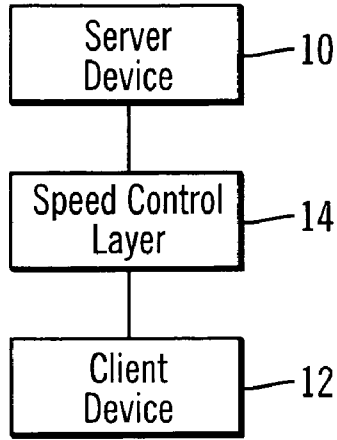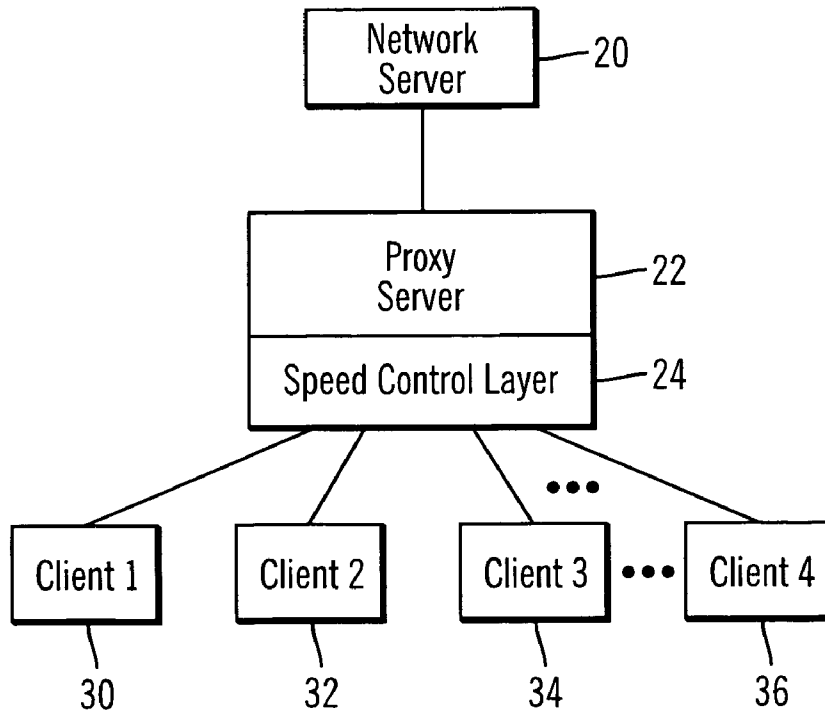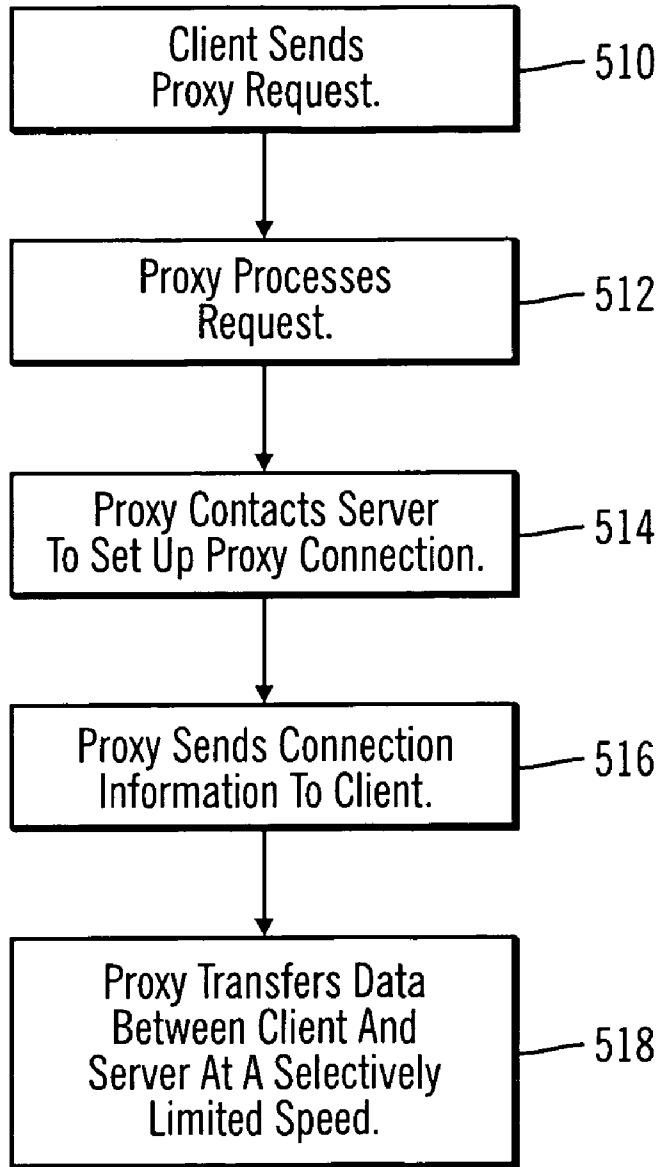
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FIG. 1

FIG. 2

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┌─────────────────────────┐
│      Client Sends       │──── 510
│     Proxy Request.      │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│     Proxy Processes     │──── 512
│        Request.         │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│   Proxy Contacts Server │──── 514
│ To Set Up Proxy Connection. │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│  Proxy Sends Connection │──── 516
│   Information To Client. │
└─────────────────────────┘
             │
             ▼
┌─────────────────────────┐
│    Proxy Transfers Data │
│    Between Client And   │──── 518
│  Server At A Selectively │
│      Limited Speed.     │
└─────────────────────────┘
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FIG. 3

SIMULATED LOW-BANDWIDTH CONNECTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to computer systems, and more specifically to a method and apparatus for simulating a low-bandwidth connection over a higher-bandwidth connection.

2. Description of Related Art

As computing power and computer memory have become more affordable, local area computer networks (LANs) have largely displaced mainframes and minicomputers as a business platform. Further, large and dispersed public networks such as the Internet have been created and expanded throughout the world. While computers that are directly connected to the Internet or a LAN receive data at a high speed through a high-bandwidth connection, the typical home computer receives data at a much lower speed through a low-bandwidth connection. For example, while a LAN can currently transfer data to a directly connected client computer at 16 Mbps, the expense of such connections effectively limits home computers to a transfer speed of 128 kbps through an ISDN line and the vast majority of home computers connect through a modem at rates such as 56 kbps and 28.8 kbps.

Programmers that develop network centric software for use by home computer users typically work on high speed LANs to boost productivity. However, many of the home users targeted by the software have network connections in the 28.8 kbps range, as explained above. Thus, a common problem for the network program developers is a failure to be able to properly simulate the experience the end user has when using the software over the network. In particular, while the developers understand that a 28.8 kbps connection speed is generally adequate for surfing the Internet and running Java applets, the network centric code that is developed is seldom tested by the developer in the user's 28.8 kbps environment. Therefore, the developers never actually experience their software from the viewpoint of a typical user.

This common situation has lead to many problems. First, programs that work quite well on LANs sometimes fail entirely when accessed over a low speed connection. For example, large applets can take so long to load that the user thinks the browser has crashed and closes the browser window. Likewise, with a point and click graphical user interface (GUI), if the actual connection speed is not properly accounted for the end user can get out of sync with what the GUI is doing. If the user clicks on an icon and nothing happens in a short time, he assumes the program has stopped responding. Further, an animation that looks normal at the developer's LAN connection speed can be difficult to recognize and understand at the user's modem speeds.

One way for a developer to experience the user's viewpoint is to use another computer that is connected to the network through an actual modem. However, this is seldom done primarily due to the fact that it is often impractical for security and hardware reasons to provide telephone or other low speed connections to the developer's LANs. In a work environment, additional hardware and analog phone lines can be difficult for the developer to obtain. Further, allowing

SUMMARY OF THE INVENTION

In view of these drawbacks, it is an object of the present invention to remove the above-mentioned drawbacks and to provide a simulated low-bandwidth connection over a higher-bandwidth connection. A speed control layer is placed between two devices. The speed control layer adjusts the speed at which data is transferred from one device to the other. Therefore, a developer can easily experience the program being developed from the standpoint of a typical user.

Another object of the present invention is to provide a method for simulating any speed connection on a faster network.

Yet another object of the present invention is to provide simulated low-bandwidth access in parallel with high-bandwidth access on the same computer system.

One embodiment of the present invention provides a method of simulating a low-bandwidth connection over a higher-bandwidth connection. According to the method, data is received from a first device at a first predetermined speed, and the data is transferred to a second device over the high-bandwidth connection at a second predetermined speed. The second predetermined speed is less than the first predetermined speed and less than the speed of the high-bandwidth connection. In one preferred method, the data is transferred over a high-bandwidth LAN and the second predetermined speed is the speed of a modem connection.

Another embodiment of the present invention provides a computer system that includes a first device, a second device, and a speed control layer. The speed control layer is coupled between the first and second devices, and slows data transfer from the first device to the second device over a connection to a first predetermined speed that is less than the normal speed of the connection. In a preferred embodiment, the speed control layer includes an interface that is used to set the first predetermined speed.

Other objects, features, and advantages of the present invention will become apparent from the following detailed description. It should be understood, however, that the detailed description and specific examples, while indicating preferred embodiments of the present invention, are given by way of illustration only and various modifications may naturally be performed without deviating from the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram showing two devices coupled together through a speed control layer in accordance with one embodiment of the present invention;

FIG. 2 is a block diagram showing a computer network that includes a speed control layer according to a preferred embodiment of the present invention; and

FIG. 3 is a flow chart showing a process for simulating a low-bandwidth connection in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Preferred embodiments of the present invention will be described in detail hereinbelow with reference to the attached drawings.

FIG. 1 shows a system that includes a speed control layer

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