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(54) **Apparatus for providing information, method of providing information and computer-readable storage medium retaining a program for providing information**

(57) When making a request for providing information from a VOD server 11, a client uses a WWW browser 27 for accessing an HTML document including a control code for controlling the VOD server 11. If an HTML document distributed from a WWW server 21 includes the control code, the client sends a request for controlling the VOD server 11 to the WWW server 21 via a network 18 (which may include the Internet). The

control request is sent from the WWW server 21 to a server interface 23. The server interface 23 gives an instruction to a server controller 22 for controlling the VOD server 11. Output data of the VOD server 11 (e.g. AV data) is supplied to the client through a wide bandwidth transmission line 19 different from the network 18.

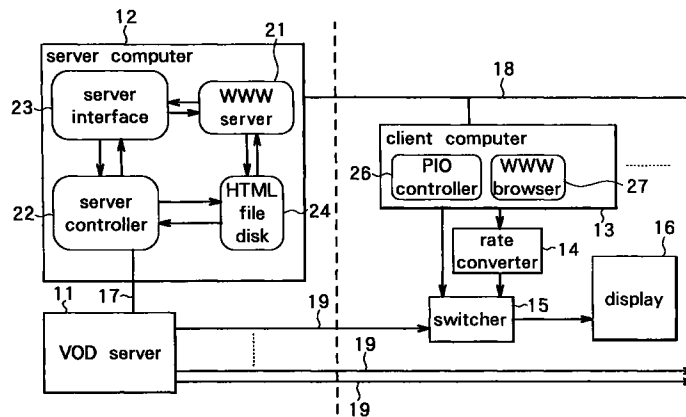


FIG.1

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## Description

## Background of the Invention

## Technical Field Pertinent to the Invention

The present invention relates to an apparatus for providing specific information on demand and a method thereof and a computer-readable storage medium retaining a program for providing information.

## Prior Art

A video on demand (VOD) system has been commercialized for distributing video data and audio data and so on from a server on a client's demand for obtaining a movie, a program, etc. In a conventional VOD system a client's side terminal unit uses dedicated software for communications with a server. The dedicated software provides a user interface, using a programming language such as the C language, which responds to demands of a client input at a client's side terminal unit. Furthermore the dedicated software is designed to conform to sections for communicating with server control software.

The VOD system may be used by various clients including a museum, a showroom, a small theater and a shop. It is therefore required to provide a client's side terminal unit with a user interface specifically designed for each user. Each user interface may dynamically change with time and seasons or with an exhibition at a museum and so on.

However, customization of each user interface is not easily achieved for responding to each customer's demands in the method using the dedicated software in the client's side terminal unit for communications with the server. It is therefore difficult for the conventional VOD system to deal with frequent changes of a user interface and to support various clients with different specifications.

Another problem of the VOD system for use by various clients is the difficulty in creating a renewed user interface conforming to the client's demands. That is, for introducing the VOD system, it is required to newly create a means for communications between a client's side terminal unit and a server in a physical form as well as in a form of software. On the server's side, server control software dedicated to the VOD system is required for controlling the server. On the other hand, it is required for the client's side terminal unit to communicate with the server control software on the server's side through client software operating on the terminal unit for requesting the server control software for reproducing image data or audio data and so on.

Although a VOD system has been described so far, the foregoing problems apply to any system for providing information on a client's demand.

It is an object of the invention to provide an apparatus

for providing information and a method thereof and a computer-readable storage medium retaining a program for providing information, each for easily creating and customizing a user interface conforming to client's demands.

## SUMMARY OF THE INVENTION

An apparatus of the invention for providing information comprises a means for receiving a demand for providing information from a client through a network, using a world wide web as a system for providing a link to information on an Internet, and a means for sending information to the client through a transmission line different from the network in response to the demand for providing information from the client received by the means for receiving a demand.

A method of the invention for providing information comprises the steps of receiving a demand for providing information from a client through a network, using the world wide web as a system for providing a link to information on the Internet, and sending information to the client through a transmission line different from the network in response to the received demand for providing information from the client.

A computer-readable storage medium according to the invention stores a program for providing information which allows a computer to implement a function of receiving a demand for providing information from a client through a network, using the world wide web as a system for providing a link to information on the Internet, and a function of sending information to the client through a transmission line different from the network in response to the demand for providing information from the client received by the function of receiving a demand.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram illustrating a main part of a VOD system including an information providing apparatus of an embodiment of the invention.

Fig. 2 is a block diagram illustrating an overall configuration of the VOD system of the embodiment of the invention.

Fig. 3 is a block diagram illustrating an example of a computer used as a server computer and a client computer in Fig. 1.

Fig. 4 is a block diagram illustrating an example of a VOD server in Fig. 1.

Fig. 5 is a table for showing an example of a relationship table stored in the server computer in Fig. 1.

Fig. 6 is a chart for illustrating an operation of the VOD system of the embodiment of the invention.

Fig. 7 illustrates a relationship between a frame outputted from the client computer and a frame shown on a display.

Fig. 8 illustrates the VOD system of the embodi-

ment connected to an external Internet.

Fig. 9 illustrates the client computer of the embodiment connected to a plurality of server computers for VOD server control.

Fig. 10 illustrates an example of a CATV system.

Fig. 11 is a block diagram illustrating a modification of the VOD server of the embodiment of the invention.

Fig. 12 illustrates an application of the invention to an auto-changer system using disk players.

Fig. 13 illustrates an application of the invention to an auto-changer system using video cassette recorders.

### Detailed Description of Certain Preferred Embodiments

A preferred embodiment of the invention will now be described in detail with reference to the accompanying drawings.

Fig. 1 is a block diagram illustrating a main part of a VOD system including an apparatus for providing information of an embodiment of the invention. The VOD system is a system for providing specific video information and audio information through a plurality of channels on demands of a plurality of clients for providing information. The VOD system comprises: a VOD server 11 for storing information to be provided for clients and sending out a specific piece of information in response to instructions; a server computer 12 for controlling the VOD server 11; a client computer 13 for sending a request for providing information to the server computer 12; a rate converter 14 for converting video signals outputted from the client computer 13 into video signals for display on a display 16; a switcher 15 for switching between video signals sent from the VOD server 11 via a high bandwidth, independent link 19 and video signals outputted from the rate converter 14 for output to the display 16 for displaying a video image. The apparatus for providing information of the embodiment is made up of the VOD server 11 and the server computer 12.

The VOD server 11 has output channels for a plurality of video data and audio data (referred to as AV data in the following description). The VOD server 11 and the server computer 12 are connected to each other through a serial transmission line 17 utilizing a serial interface such as an RS232C. The server computer 12 and the client computer 13 are connected to each other through a network 18, such as an Internet, using an Ethernet, for example. Although the one client computer 13 is shown in Fig. 1, a plurality of client computers 13 each receiving information from the VOD server 11 are connectable to the network 18 and a separate channel or link 19. Each switcher 15 corresponding to one of the client computers 13 is connected to one of the plurality of output channels of the VOD server 11 through the separate transmission line 19.

In the embodiment the VOD server 11 and the server computer 12 are called a server's side. The client

computer 13, the rate converter 14, the switcher 15 and the display 16 are called a client's side.

The server computer 12 comprises: a world wide web (WWW) server 21 for management and distribution and so on of information carried on the Internet using a WWW as a system for allowing a link to information on the Internet; a server controller 22 for controlling the VOD server 11 by giving a command to the VOD server 11 through the serial transmission line 17; a server interface 23 for interfacing between the WWW server 21 and the server controller 22; and a hypertext markup language (HTML) file disk 24 for storing an HTML document written in the HTML as a hypertext language. The HTML file disk 24 is accessible from either the WWW server 21 or the server controller 22. The WWW server 21, the server controller 22 and the server interface 23 are each implemented by reloadable software (programs). The HTML file disk 24 is implemented by a hard disk in the server computer 12.

The server computer 12 shown in Fig. 1 corresponds to a means for receiving a demand (a function of receiving a demand), a means for generating information indicating sending (a function of generating information indicating sending) and a means for sending a program (a function of sending a program). The VOD server 11 corresponds to a means for sending information (a function for sending information).

The server computer 12 uses Windows NT® (a registered trademark of Microsoft Corporation), for example, for an operating system. The WWW server 21 is implemented through installing software such as Microsoft-Internet information server (IIS™, a trademark of Microsoft Corporation). The server interface 23 is, for example, implemented by software designed in compliance with an Internet server application programming interface (ISAPI) as additional software for providing extensions for the WWW server implemented by the IIS.

The client computer 13 comprises: a parallel input/output (PIO) controller 26 for controlling parallel inputs and outputs and a WWW browser 27 for accessing a WWW server on the Internet using the WWW. A suitable browser might be the commercially available Internet Explorer™ (a trademark of Microsoft Corporation) or Netscape Navigator® (a registered trademark of Netscape Communications Corporation). The PIO controller 26 and the WWW browser 27 are each implemented by software (a program). The PIO controller 26 has a function of controlling the switcher 15 at commands from the WWW server 21.

HTML documents are stored on the HTML file disk 24 in the server computer 12. The HTML documents include control codes for implementing a user interface using the WWW browser 27. The control codes included in the HTML documents include control codes for controlling the VOD server 11. The WWW browser 27 sends a request via the network 18 for controlling the VOD server 11 to the WWW server 21 when a control code for controlling the VOD server 11 is included in an

HTML document distributed via the network 18 from the WWW server 21. The control request is sent from the WWW server 21 to the server interface 23. The server interface 23 gives an instruction to the server controller 22 for executing control at the control request. On receiving the instruction, the server controller 22 gives a command to the VOD server 11 through the serial transmission line 17 to control the VOD server 11.

The server controller 22 has data of a table indicating a relationship between the output channels and Internet addresses (IP addresses), that is, addresses on the network 18 of the plurality of client computers 13. Fig. 5 shows an example of such a relationship table. The relationship table is made by an administrator of the VOD system. When the client computer 13 makes a request for providing information, the server controller 22 refers to the relationship table to determine the output channel corresponding to the Internet address of the client computer 13 that made the request. The server controller 22 then controls the VOD server 11 so that the requested information is sent through the corresponding separate link 19 to the client computer 13 that made the request for providing the information.

Fig. 2 is a block diagram illustrating an overall configuration of the VOD system of the embodiment. The VOD system shown comprises: the server computer 12 connected to the network 18; the VOD server 11 whose operation is controlled by the server computer 12; and four terminal units 31 to 34 of the client's side each connected to the network 18. In this example the VOD server 11 has six output channels ch1 to ch6 for AV data. The terminal units 31 to 34 receive AV data from the respective output channels ch1 to ch4 of the VOD server 11 via the separate links 19. In Fig. 2 V and A each represent video data and audio data, respectively.

The terminal unit 31 has a configuration similar to that of the client's side in Fig. 1. The terminal unit 31 comprises: a client computer 13 connected to the network 18; a rate converter 14 for converting video signals outputted from the client computer 13 into video signals for display on a display 16; a switcher 15 for switching between video signals sent from the VOD server 11 and video signals outputted from the rate converter 14 for output; and a display 16 for receiving video signals outputted from the switcher 15 and displaying a video image. Besides switching video signals, the switcher 15 in this example further has a function of switching between audio signals sent from the VOD server 11 and audio signals outputted from the client computer 13. The terminal unit 31 further comprises active speakers 36 and headphones 37 for receiving audio signals outputted from the switcher 15 for audio output; and a trackball 38 connected to the client computer 13. In the example the client computer 13 has a function of receiving video signals from an external source for manipulation. Video signals sent from the VOD server 11 are inputted to the client computer 13 as well.

The terminal unit 32 comprises two head-mount

displays 39 instead of the display 16, the active speakers 36 and the headphones 37 in the terminal unit 31. The head-mount displays 39 each incorporate speakers and receive video and audio signals outputted from the switcher 15 for image display and audio output.

The terminal unit 33 comprises: a client computer 13 connected to the network 18; a touch monitor 41 for displaying video signals outputted from the client computer 13 and for functioning as a touch panel used for giving instructions to the client computer 13; active speakers 42 and headphones 43 for receiving audio signals outputted from the VOD server 11 and audio signals outputted from the client computer 13 for audio output. The client computer 13 in the terminal unit 33 has a function of receiving video signals from an external source for manipulation. Video signals sent from the VOD server 11 are inputted to the client computer 13 as well. The client computer 13 further has a function for overlaying an image made of video signals sent from the VOD server 11 on a frame created by the client computer 13 on the touch monitor 41. Another function of the client computer 13 is controlling the overlay display at commands from the WWW server 21.

The terminal unit 34 comprises: a client computer 13 connected to the network 18; a touch panel 44 for displaying video signals outputted from the client computer 13 and for giving instructions to the client computer 13; a display 45 for receiving video signals sent from the VOD server 11 for video image display; and an audio system 46 for receiving audio signals outputted from the VOD server 11 for audio output.

Fig. 3 is a block diagram illustrating an example of a computer used as the server computer 12 and the client computer 13 in Fig. 1. The computer comprises: a central processing unit (CPU) 51; read only memory (ROM) 52; random access memory (RAM) 53; an interface (shown as in I/F in the Figure) 54 for a display; an interface 60 for connection with the network 18; and a bus 50 for connecting the constituents. The computer further comprises: a hard disk 62; a CD-ROM drive 63; a floppy disk drive 64; a keyboard 65; and a mouse 66, each connected to the bus 50 through separate interfaces 55 to 59, respectively.

In the computer shown in Fig. 3, the CPU 51 executes an application program stored in any of the hard disk 62, a CD-ROM driven by the CD-ROM drive 63 and a floppy disk driven by the floppy disk drive 64, with the RAM 53 as a work area. In the server computer 12, a program for implementing the WWW server 21, the server controller 22 and the server interface 23 corresponds to a program for sending information of the embodiment. Consequently, a CD-ROM or a floppy disk corresponds to a computer-readable storage medium retaining a program for sending information when a program for implementing the WWW server 21, the server controller 22 and the server interface 23 in the server computer 12 is stored on either the CD-ROM driven by the CD-ROM drive 63 or the floppy disk driven by the



floppy disk drive 64 and the program stored thereon is then installed on the hard disk 62.

Fig. 4 is a block diagram illustrating an example of the VOD server in Fig. 1. The VOD server 11 shown comprises a storage section 71 and a control section 72. The storage section 71 has a plurality of hard disk drives (HDDs) 73 each for driving a hard disk. AV data to be provided for a client is stored on a hard disk driven by each HDD 73.

The control section 72 has: a main CPU 74; a HDD interface (shown as HDD I/F) 75; AV data output sections 76 for every output channel connected to a separate link 19; and an internal bus 77 for interconnecting the constituents. The HDD interface 75 is connected to the HDDs 73 in the storage section 71. Each AV data output section 76 outputs AV data retrieved from the hard disk in the storage section 71 through the HDD interface 75 to a transmission line 19 in Fig. 1 through a corresponding channel 76. The main CPU 74 has a communication section 78 for communicating with the server computer 12 through the serial transmission line 17 in Fig. 1 and an AV data interface (shown as AV data I/F) 79 for receiving AV data to be stored in the storage section 71 from an encoder not shown. The communication section 78 and the AV data interface 79 are implemented through software. The main CPU 74 receives commands sent from the server computer 12 through the serial transmission line 17 at the communication section 78. In accordance with the commands the main CPU 74 controls the HDD 73 in the storage section 71 for retrieving desired AV data. The retrieved AV data is then outputted through the AV data output section 76 in accordance with the commands.

The operations of the VOD system shown in Fig. 1 will now be described, including operations of the VOD server 11 and the server computer 12 as an apparatus for providing information of the embodiment. The following description serves for a method of providing information of the embodiment and a program for providing information stored in a computer-readable storage medium of the embodiment as well.

As previously mentioned, the HTML file disk 24 in the server computer 12 stores HTML documents including control codes for implementing a user interface using the WWW browser 27. The control codes included in the HTML documents include control codes for controlling the VOD server 11. When a request is made on the client's side for control of the VOD server 11, such as a request for providing information, that is, for replaying AV data, the WWW browser 27 is used for accessing the HTML document including a control code for controlling the VOD server 11. The WWW browser 27 gives a request for controlling the VOD server 11 to the WWW server 21 when control codes for controlling the VOD server 11 are included in an HTML document distributed from the WWW server 21. The control request is sent from the WWW server 21 in the server computer 12 to the server interface 23. The server inter-

face 23 gives an instruction to the server controller 22 for executing control at the control request. On receiving the instruction the server controller 22 gives commands to the VOD server 11 through the serial transmission line 17 to control the VOD server 11.

A specific example will now be given for the control code for controlling the VOD server 11 included in an HTML document. In general, addition of application software to the WWW server 21 allows translation of an HTML document and a database search and so on. Using this function the embodiment of the invention achieves communications with the server controller 22 for controlling the VOD server 11, instead of performing translation of an HTML document and so on. Therefore a general-purpose code is used for the control code added to an HTML document. For example, the following code is used in practice for controlling the VOD server 11 using an HTML document:

```
<HTML>
<BODY>
<A
  HREF=http://www.address/script/dll/VSRSI.dll?play
  ?1&/home/play1.html> Play Clip 1</A>
</BODY>
</HTML>
```

In the above code, "Play Clip 1" is indicated on the display 16 on the client's side to which the HTML document is distributed including the above code. If "Play Clip 1" is selected (or clicked, for example) on a frame shown on the display 16 on the client's side, the WWW browser 27 sends the URL address:

"http://www.address/scripts/dll/VSRSI.dll?play?1&/home/play1.html" in the code to the WWW server 21. "VSRSI.dll?play?1&/home/play1.html" is a command for starting up software implementing the server interface 23. VSRSI is a name of the software implementing the server interface 23. The address and directory of the server where "VSRSI.dll" is located is "http://www.address/script/dll". The server interface 23 is thus started and operated. In the code "play?1&/home/play1.html" is a parameter for controlling the VOD server 11, such as a number of a clip (an AV program). In the example clip number 1 is designated for replay. Furthermore a homepage ("/home/play1.html") is designated to be displayed during replay of the clip.

The server interface 23 started as described above also sends the Internet address of the client computer 13 having made the request to the server controller 22 in addition to the parameter. The server controller 22 analyzes the parameter and gives a command to the VOD server 11 through the transmission line 17 for controlling the VOD server 11. The server controller 22 designates the output channel corresponding to the Internet address, referring to the table indicating the relationship between the Internet addresses and the

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