PCT
WORLD INTELLECTUAL PROPERTY ORGANIZATION
International Bureau

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : H04L 29/06

A2

(11) International Publication Number: WO 97/44942

(43) International Publication Date: 27 November 1997 (27.11.97)

(21) International Application Number: PCT/US97/08679

(22) International Filing Date: 22 May 1997 (22.05.97)

(30) Priority Data:
60/018,256 24 May 1996 (24.05.96) US

(71) Applicant: NARRATIVE COMMUNICATIONS CORP. [US/US]; 204 Second Avenue, Waltham, MA 02154 (US).

(72) Inventors: KLIGER, Scott, A.; 18 Jacob Amsden Road, Westborough, MA 02581 (US). MIDDLETON, Thomas, M., III; 25 Burditt Avenue, Hingham, MA 02043 (US). WHITE, Gregory, T.; 31 Old Billerica Road, Bedford, MA 01730 (US).

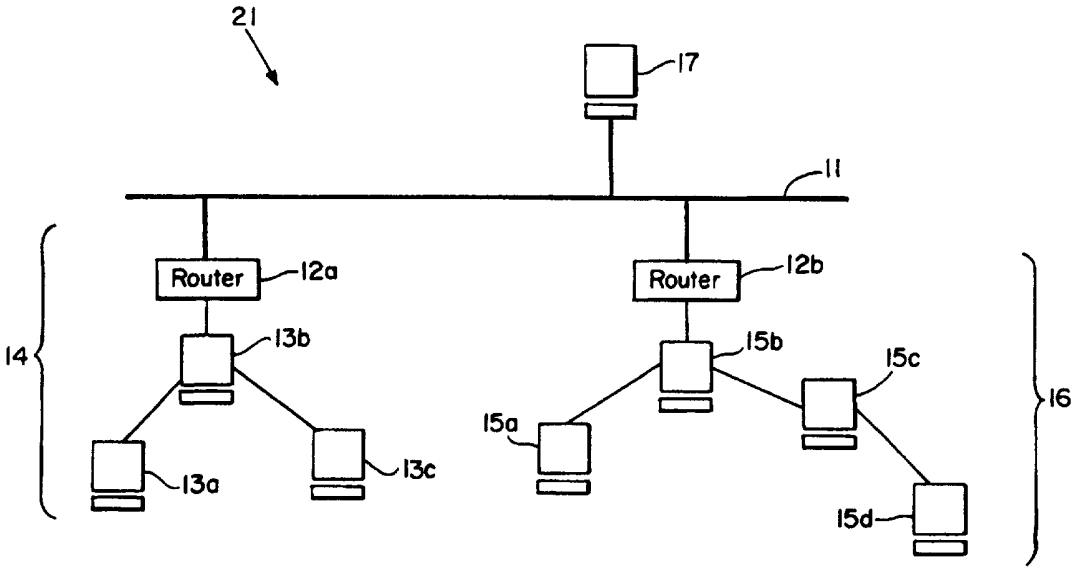
(74) Agents: WAKIMURA, Mary, Lou et al.; Hamilton, Brook, Smith & Reynolds, P.C., Two Militia Drive, Lexington, MA 02173 (US).

(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).

Published

Without international search report and to be republished upon receipt of that report.

(54) Title: COMPUTER METHOD AND APPARATUS FOR OBJECT STREAMING



(57) Abstract

In a distributed computing environment, a data stream is formed of a sequence of requested objects. The defined order of the sequence of objects is determined from a client request for data. The order may be a default order, or, alternatively, the server may track client criteria to determine the order. For example, the server (17) may track objects previously transmitted in the stream to the client (13) such that there is no duplication of objects. In other instances, the server may select an object from a class of objects, depending upon object quality, bandwidth, client location, and other client-specific criteria. The server compiles and transmits the object data stream in real-time (on-the-fly) based on the criteria. Buffering of data with pausing to rectify buffer debt is provided by the client.

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	**ES**	Spain	**LS**	Lesotho	**SI**	Slovenia
AM	Armenia	**FI**	Finland	**LT**	Lithuania	**SK**	Slovakia
AT	Austria	**FR**	France	**LU**	Luxembourg	**SN**	Senegal
AU	Australia	**GA**	Gabon	**LV**	Latvia	**SZ**	Swaziland
AZ	Azerbaijan	**GB**	United Kingdom	**MC**	Monaco	**TD**	Chad
BA	Bosnia and Herzegovina	**GE**	Georgia	**MD**	Republic of Moldova	**TG**	Togo
BB	Barbados	**GH**	Ghana	**MG**	Madagascar	**TJ**	Tajikistan
BE	Belgium	**GN**	Guinea	**MK**	The former Yugoslav Republic of Macedonia	**TM**	Turkmenistan
BF	Burkina Faso	**GR**	Greece			**TR**	Turkey
BG	Bulgaria	**HU**	Hungary	**ML**	Mali	**TT**	Trinidad and Tobago
BJ	Benin	**IE**	Ireland	**MN**	Mongolia	**UA**	Ukraine
BR	Brazil	**IL**	Israel	**MR**	Mauritania	**UG**	Uganda
BY	Belarus	**IS**	Iceland	**MW**	Malawi	**US**	United States of America
CA	Canada	**IT**	Italy	**MX**	Mexico	**UZ**	Uzbekistan
CF	Central African Republic	**JP**	Japan	**NE**	Niger	**VN**	Viet Nam
CG	Congo	**KE**	Kenya	**NL**	Netherlands	**YU**	Yugoslavia
CH	Switzerland	**KG**	Kyrgyzstan	**NO**	Norway	**ZW**	Zimbabwe
CI	Côte d'Ivoire	**KP**	Democratic People's Republic of Korea	**NZ**	New Zealand		
CM	Cameroon			**PL**	Poland		
CN	China	**KR**	Republic of Korea	**PT**	Portugal		
CU	Cuba	**KZ**	Kazakstan	**RO**	Romania		
CZ	Czech Republic	**LC**	Saint Lucia	**RU**	Russian Federation		
DE	Germany	**LI**	Liechtenstein	**SD**	Sudan		
DK	Denmark	**LK**	Sri Lanka	**SE**	Sweden		
EE	Estonia	**LR**	Liberia	**SG**	Singapore		

COMPUTER METHOD AND APPARATUS FOR OBJECT STREAMING

REFERENCE TO CO-PENDING APPLICATION

This application claims the benefit of a United States Provisional Application Serial No. 60/018,256 filed May 24, 1996.

BACKGROUND

"Distributed computing" makes use of a computer network formed out of one or more computers loosely coupled together to allow processes on different computers to communicate with each other and to provide services for each other. One of the most common paradigms of distributed computing is known as the "client-server model", in which consumers of services are called "clients", and make requests of service providers, called "servers".

In object oriented distributed computing, there is a notion of computer entities called "objects". Each object comprises a particular state and a set of defined behaviors. The state is represented by data maintained by the object. The behavior is specified in terms of operations that the object can perform with the operations, typically realized by executable code. Conceptually, the data and the code are inextricably bound together in the object. Objects may be "persistent", that is, they may continue to exist even though they are inactive or the computer on which they exist has failed or has been turned off. Further, objects may issue requests for services to other objects as well as supply services.

Typically, data is held in linear files on a server. When a client requests that data or a part thereof, a connection is formed between the data source (server) and delivery (client) point.

In the prior art there are in general two different types of servers. The first, known as a web server, typically stores data files of a number of different types. Web servers typically communicate with clients over a network such as the Internet using the well known TCP/IP protocol. The second type of server, known as a streaming media server, stores and transmits media files of various types.

More particularly, the web servers presently in use typically store data files in a format known as Hyper Text Markup Language(HTML). HTML permits the web servers to handle container files which reference other files of varying formats. Using HTML, a given web document may include content information in various formats and may also refer to other files by including reference information known as a Uniform Reference Locator (URL). URL's specify the location of remote servers at which files referenced in the HTML file may be located.

Upon receipt of an HTML file from the original web server, a client then must access each document referenced from its source. Each such request typically requires a full cycle of communication with a remote server, including opening a connection socket with the remote server, requesting that the file be transferred, waiting for the file to download, closing the connection, and then, finally parsing the file. To render a given web page may therefore require many such cycles.

The other type of server, known as a streaming media server, has been developed to be particularly suited for multimedia of various types. Such servers may handle single data types, such as a RealAudio™ file, or may

include mixed media types, in formats such as NetShow™ (RealAudio™ is a trademark of Progressive Networks, Inc., and NetShow™ is a trademark of Microsoft Corporation). In any event, media files are typically laid out in a linear fashion in a single file. Thus, when the client requests a file from a streaming server, a socket is simply opened and delivery of data is begun.

The client may perform a caching or buffering operation prior to actual play back of the media file. This ensures that the media file is played back to the user of the client computer in a continuous stream. In particular, the client may calculate in advance an amount of data that it must have on hand prior to actually beginning to render the media file, so that the user has an impression of continuous delivery of the media.

In such a linear streaming server, files may be formatted in advance with a specific communication transfer bandwidth in mind. For example, a Real Audio file may have been compressed for receipt at a baud rate such as 14.4 kilo bits per second (kbps). Another file would be made available for optimum playback at 28.8 kbps. These different file formats provide for allowances in playing back data such that it is rendered in a continuous fashion at the respective rates.

In streaming media server, the connection remains open with the server during the full duration of the play back of the file. Thus, for example, even on a high speed network connection such as a T1 line, if the media file is a ten minute audio file, then the connection will remain open for ten minutes, even though the available information transfer rate on a T1 line is much greater than the audio bandwidth.

In addition, one other disadvantage of streaming media servers is that they typically implement a lossy type of compression algorithm. Thus, if network traffic increases

DOCKET ALARM

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts

Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research

With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips

Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS
Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS
Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS
Sync your system to PACER to automate legal marketing.