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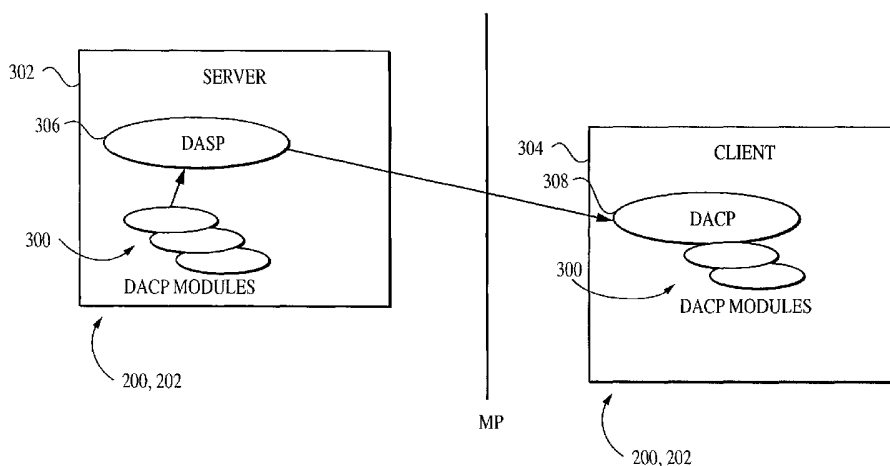
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: METHOD AND APPARATUS FOR BALANCING DISTRIBUTED APPLICATIONS



(57) Abstract: An improved method and apparatus for balancing distributed applications within a client/server network, such as a cable television network, is disclosed. In one aspect of the invention, a method of balancing the load of distributed application client portions (DACPs) across various server portions (DASPs) and server machines is disclosed. Statistics are maintained by one or more software processes with respect to the available resources of the servers and their loading; new process threads and/or distributed application server portions are allocated across the servers to maintain optimal system performance as client device loading increases or changes. In another aspect of the invention, a novel object-oriented distributed application software architecture employing both vertical and horizontal partitions and "mutable" (i.e., transportable) objects is disclosed. The mutable objects may reside on either the server or client portions of the distributed application while maintaining at least one network partition. A runtime environment adapted for the operation of the foregoing object-oriented distributed application, including an efficient message protocol useful for interprocess communication, is also disclosed. Methods for downloading the DACP from the servers, and scaling the DACP at download based on client device configuration, are further disclosed.



WO 01/093033 A3

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 01/17160

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G06F9/50

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, INSPEC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 753 811 A (SONY CORP) 15 January 1997 (1997-01-15) the whole document	1-3
A	GB 2 331 600 A (IBM) 26 May 1999 (1999-05-26) abstract	1
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 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	W. GRAIG TRADER <CT7@VITELINC.COM>: "Re: Question about IIOP and unsigned applets" INTERNET DOCUMENT: NEWSGROUP ARCHIVE, [Online] 6 December 1999 (1999-12-06), XP002198994 comp.lang.java.corba Retrieved from the Internet: <URL:http://groups.google.com/groups?selm= 384C337B.38B3EBA5%40vitelinc.com&output=gp lain> [retrieved on 2002-05-15] page 1, last line -page 2, line 6 -----	

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 01/17160

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-3

Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-3

Conditionnal software code transfer to a client

2. Claims: 4-7, 17,18

Migration of a portion of a distributed application

3. Claims: 8-12

Local communication in a distributed application

4. Claims: 13-16, 19-27, 31-34, 42

Load balancing of client requests between a plurality of servers

5. Claims: 28-30

Maintaining communications links between migrating components

6. Claims: 35-41

Transmitting server resource usage

INTERNATIONAL SEARCH REPORT

International Application No
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