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[Continued on next page]

(54) Title: METHOD AND SYSTEM FOR DATA STORAGE AND MANAGEMENT

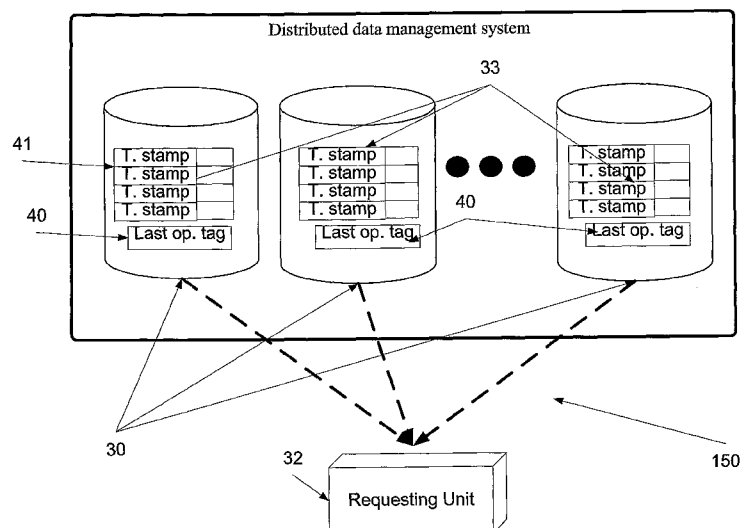


Fig. 6

(57) Abstract: According to some embodiments of the present invention there is provided a method and a system for managing data storage in a plurality of data partitions, such as replica databases. The method is based on analyzing, for each physical data partition, the received memory access queries. Each memory access query has a different result table which is based on different fields. This analysis is performed to determine the frequency of receiving each one of the memory access queries. The analysis allows, for one or more of the analyzed memory access queries, associating between at least one key of a respective result table and at least one of the physical data partitions. In such an embodiment, data elements are stored according to a match with respective said at least one key.

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL 08/00906

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G06F 12/00 (2008.04)

USPC - 711/153

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)

USPC - 711/153

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

USPC - 711/100,147,162 | 707/1-3

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

Dialog Classic (Chinese Pat Abstr; Derwent Index, EPFT, French Pat, Jap Abstr, USPFT, WIPO/PCT PFT); Google Scholar; Terms searched: ASSOCIAT, BACKED UP, DATA, FREQUENCY, LOGICAL, PARTITION, MEMORY, QUER, STATISTIC, STOR, STORED, TIMES, TREE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/0158842 A1 (Levy et al.) 21 August 2003 (21.08.2003); entire document, especially: para [0019], para [0020], para [0132], para [0303], para [0304], para [0310], paras [0327]-[0329], para [0389]	1-3, 6-9
Y		4-5
Y	US 6,483,446 B1 (Beach et al.) 19 November 2002 (19.11.2002); entire document, especially: col 10, ln 11-16	4-5
A	US 2006/0155679 A1 (Kothuri et al.) 13 July 2006 (13.07.2006)	1-3, 6-9

☐ Further documents are listed in the continuation of Box C.

* 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 application or patent 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

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL 08/00906

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 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 No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

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

Group I: claims 1-9
Group II: claims 10-13
Group III: claims 14-18
Group IV: claims 19-21
Group V: claims 22-24

Reasons for Lack of Unity of Invention:

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I: claims 1-9, drawn to a method for managing data storage in a plurality of physical data partitions containing calculating a frequency of receiving each of a plurality of memory access queries.
-see extra 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 additional fees, this Authority did not invite payment of additional fees.
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.:
1-9

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/IL 08/00906

Continuation of Box III: Observations where unity of invention is lacking

Group II: claims 10-13, drawn to a method for retrieving at least one record from a plurality of replica databases containing time tagging the editing of each record with a first time tag and the last editing performed in each replica database with a second time tag.

Group III: claims 14-18, drawn to a method for validating at least one record of a remote database containing receiving an index response from a first network node and extracting respective key and validating a copy by matching between values in respective key of the copy and an index response.

Group IV: claims 19-21, drawn to a method for retrieving records in a distributed data system containing receiving a request for a first of a plurality of records at a front end node of the distributed data system and using said storage node for extracting a reference for the first record from the index and sending a request for the first record.

Group V: claims 22-24, drawn to a system for backing up plurality of virtual partitions containing a plurality of replica databases and a data management module configured for synchronizing between a plurality of data elements of each virtual partition.

The inventions listed as Groups I - V do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: The special technical feature of the Group I invention is a method for managing data storage in a plurality of physical data partitions containing calculating a frequency of receiving each of a plurality of memory access queries. The special technical feature of the Group II invention is a method for retrieving at least one record from a plurality of replica databases containing time tagging the editing of each record with a first time tag and the last editing performed in each replica database with a second time tag. The special technical feature of the Group III invention is a method for validating at least one record of a remote database containing receiving an index response from said first network node and extracting respective key and validating a copy by matching between values in respective key of the copy and an index response. The special technical feature of the Group IV invention is a method for retrieving records in a distributed data system containing receiving a request for a first of a plurality of records at a front end node of the distributed data system and using a storage node for extracting a reference for the first record from the index and sending a request for the first record. The special technical feature of the Group V invention is a system for backing up plurality of virtual partitions containing a plurality of replica databases and a data management module configured for synchronizing between a plurality of data elements of each virtual partition.

None of these special technical features are common to the other groups, nor do they correspond to a special technical feature in the other groups. Therefore, unity of invention is lacking.