

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

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PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing
(day/month/year) 20 OCT 2016

Applicant's or agent's file reference
1345-013WO

FOR FURTHER ACTION

See paragraph 2 below

International application No.

PCT/US 16/44537

International filing date (day/month/year)

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30 July 2015 (30.07.2015)

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

IPC(8) - G06F 17/30 (2016.01)

CPC - G06F 17/30864, G06F 17/30398, G06F 17/30595

Applicant ALGEBRAIX DATA CORP.

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1 bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US
Mail Stop PCT, Attn: ISA/US
Commissioner for Patents
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Date of completion of this opinion

02 October 2016

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Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:
 - the international application in the language in which it was filed.
 - a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. This opinion has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43 *bis*.1(a)).
3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
 - on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	<u>7, 8, 15, 16</u>	YES
	Claims	<u>1-6, 9-14, 17-20</u>	NO
Inventive step (IS)	Claims	<u>NONE</u>	YES
	Claims	<u>1-20</u>	NO
Industrial applicability (IA)	Claims	<u>1-20</u>	YES
	Claims	<u>NONE</u>	NO

2. Citations and explanations:

Claims 1-6, 9-14 and 17-20 lack novelty under PCT Article 33(2) as being anticipated by US 2006/0218123 A1 to Chowdhuri et al. (hereinafter 'Chowdhuri').

Regarding claim 1, Chowdhuri discloses a method for query optimization, comprising: receiving a query (receiving a query requesting data from the database, para [0015]); generating a query execution graph (directed graph is a graph whose edges are ordered pairs of vertices (nodes), para [0045]); determining a query manipulation to increase a portion of the query execution graph that is independent of data changes (role of an iterator is to process many iterations of a data set across many nodes in serial or parallel. For each iteration of a data set, the iterator applies a predefined behavior to the data set being processed, manipulating the data according to the specification of that iterator, para [0061]); manipulating the query execution graph according to the determined query manipulation; and executing the query according to the manipulated query execution graph (Most relational databases implement a variant of the Structured Query Language (SQL), which is a language allowing users and administrators to create, manipulate, and access data stored in the database, para [0109]).

Regarding claim 2, Chowdhuri discloses generating a named data source to reference the dataset resulting from the query (iterators are self-contained software objects that accept a stream of rows from one, two, or multiple data sources, para [0130]).

Regarding claim 3, Chowdhuri discloses wherein the query is a result of an insertion, a result of a deletion, and/or a streaming query (An important point to note here is that partition elimination generally applies only to scans, inserts, deletes and updates and not to other operators in the serial mode, para [0165]).

Regarding claim 4, Chowdhuri discloses wherein determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises determining a query manipulation to maximize a portion of the query execution graph that is independent of data changes (present invention introduces an optimizer property model designed to represent efficiently all combinatorics of orderings so that maximal use is made of any ordering available from an index scan or a sort node, para [0078]).

Regarding claim 5, Chowdhuri discloses wherein: determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises selecting a query manipulation to increase a portion of the query execution graph that is independent of data changes with a lowest cost from a group of query manipulations determined to increase a portion of the query execution graph that is independent of data changes; and manipulating the query execution graph according to the determined query manipulation comprises manipulating the query execution graph according to the selected query manipulation (optimizer search engine commences inspection of the search space of possible plans and plan fragments (referred to as subplans or partial plans) in order to determine the most cost effective query execution plan, para [0243]).

Regarding claim 6, Chowdhuri discloses wherein determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises recursively applying query manipulations to increase a portion of the query execution graph that is independent of data changes (A physical property (or POP) is a property that is associated with a physical operator and depends on the actual algorithm implemented by that operator and on the physical properties of its children (hence, recursively, on the physical operators in the subplan), para [0076]).

Regarding claim 9, Chowdhuri discloses a computing device, comprising: a processor configured with processor-executable instructions to perform operations comprising: receiving a query (receiving a query requesting data from the database, para [0015]); generating a query execution graph (directed graph is a graph whose edges are ordered pairs of vertices (nodes), para [0045]); determining a query manipulation to increase a portion of the query execution graph that is independent of data changes (role of an iterator is to process many iterations of a data set across many nodes in serial or parallel. For each iteration of a data set, the iterator applies a predefined behavior to the data set being processed, manipulating the data according to the specification of that iterator, para [0061]); manipulating the query execution graph according to the determined query manipulation; and executing the query according to the manipulated query execution graph (Most relational databases implement a variant of the Structured Query Language (SQL), which is a language allowing users and administrators to create, manipulate, and access data stored in the database, para [0109]).

Regarding claim 10, Chowdhuri discloses wherein the processor is further configured to perform operations further comprising generating a named data source to reference the dataset resulting from the query (iterators are self-contained software objects that accept a stream of rows from one, two, or multiple data sources, para [0130]).

---(continued in the Supplemental Boxes)---

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:
Box V, item 2. Citations and explanations:

Regarding claim 11, Chowdhuri discloses wherein the processor is further configured to perform operations such that the query is a result of an insertion, a result of a deletion, and/or a streaming query (An important point to note here is that partition elimination generally applies only to scans, inserts, deletes and updates and not to other operators in the serial mode, para [0165]).

Regarding claim 12, Chowdhuri discloses wherein the processor is further configured to perform operations such that determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises determining a query manipulation to maximize a portion of the query execution graph that is independent of data changes (present invention introduces an optimizer property model designed to represent efficiently all combinatorics of orderings so that maximal use is made of any ordering available from an index scan or a sort node, para [0078]).

Regarding claim 13, Chowdhuri discloses wherein the processor is further configured to perform operations such that: determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises selecting a query manipulation to increase a portion of the query execution graph that is independent of data changes with a lowest cost from a group of query manipulations determined to increase a portion of the query execution graph that is independent of data changes; and manipulating the query execution graph according to the determined query manipulation comprises manipulating the query execution graph according to the selected query manipulation (optimizer search engine commences inspection of the search space of possible plans and plan fragments (referred to as subplans or partial plans) in order to determine the most cost effective query execution plan, para [0243]).

Regarding claim 14, Chowdhuri discloses wherein the processor is further configured to perform operations such that determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises recursively applying query manipulations to increase a portion of the query execution graph that is independent of data changes (A physical property (or POP) is a property that is associated with a physical operator and depends on the actual algorithm implemented by that operator and on the physical properties of its children (hence, recursively, on the physical operators in the subplan), para [0076]).

Regarding claim 17, Chowdhuri discloses a non-transitory computer readable storage medium having stored thereon processor-executable software instructions configured to cause a processor of a computing device to perform operations comprising: receiving a query (receiving a query requesting data from the database, para [0015]); generating a query execution graph (directed graph is a graph whose edges are ordered pairs of vertices (nodes), para [0045]); determining a query manipulation to increase a portion of the query execution graph that is independent of data changes (role of an iterator is to process many iterations of a data set across many nodes in serial or parallel. For each iteration of a data set, the iterator applies a predefined behavior to the data set being processed, manipulating the data according to the specification of that iterator, para [0061]); manipulating the query execution graph according to the determined query manipulation; and executing the query according to the manipulated query execution graph (Most relational databases implement a variant of the Structured Query Language (SQL), which is a language allowing users and administrators to create, manipulate, and access data stored in the database, para [0109]).

Regarding claim 18, Chowdhuri discloses wherein the stored processor-executable software instructions are configured to cause the processor to perform operations further comprising generating a named data source to reference the dataset resulting from the query (iterators are self-contained software objects that accept a stream of rows from one, two, or multiple data sources, para [0130]).

Regarding claim 19, Chowdhuri discloses wherein the stored processor-executable software instructions are configured to cause the processor to perform operations such that the query is a result of an insertion, a result of a deletion, and/or a streaming query (An important point to note here is that partition elimination generally applies only to scans, inserts, deletes and updates and not to other operators in the serial mode, para [0165]).

Regarding claim 20, Chowdhuri discloses wherein the stored processor-executable software instructions are configured to cause the processor to perform operations such that determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises determining a query manipulation to maximize a portion of the query execution graph that is independent of data changes (present invention introduces an optimizer property model designed to represent efficiently all combinatorics of orderings so that maximal use is made of any ordering available from an index scan or a sort node, para [0078]).

Claims 7 and 15 lack an inventive step under PCT Article 33(3) as being obvious over Chowdhuri in view of US 2014/0074888 A1 to Potter et al. (hereinafter 'Potter').

Regarding claim 7, Chowdhuri discloses the method of claim 1, yet fails to disclose wherein determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises strategically or emergently discovering the query manipulation to increase the portion of the query execution graph that is independent of data changes. Potter discloses wherein determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises strategically or emergently discovering the query manipulation to increase the portion of the query execution graph that is independent of data changes (deployment engineer creates the package specification 1100 explicitly, or employs the discover process 2100 to identify and characterize the execution of the application in the EIS (900, 3190), para [0987], Fig. 21B). Since both references teach data manipulation, it would have been obvious to one of ordinary skill in the art to combine the queries of Chowdhuri with the discovery process of Potter since such a combination would provide better analysis of data objects.

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Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:
Box V, item 2. Citations and explanations:

Regarding claim 15, Chowdhuri discloses the computing device of claim 9, yet fails to disclose wherein the processor is further configured to perform operations such that determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises strategically or emergently discovering the query manipulation to increase the portion of the query execution graph that is independent of data changes. Potter discloses wherein the processor is further configured to perform operations such that determining a query manipulation to increase a portion of the query execution graph that is independent of data changes comprises strategically or emergently discovering the query manipulation to increase the portion of the query execution graph that is independent of data changes (deployment engineer creates the package specification 1100 explicitly, or employs the discover process 2100 to identify and characterize the execution of the application in the EIS (900, 3190), para [0987], Fig. 21B). Since both references teach data manipulation, it would have been obvious to one of ordinary skill in the art to combine the queries of Chowdhuri with the discovery process of Potter since such a combination would provide better analysis of data objects.

Claims 8 and 16 lack an inventive step under PCT Article 33(3) as being obvious over Chowdhuri in view of US 2003/0037173 A1 to Pace et al. (hereinafter 'Pace').

Regarding claim 8, Chowdhuri discloses the method of claim 1, yet fails to disclose wherein executing the query according to the manipulated query execution graph comprises executing the query according to the manipulated query execution graph to reconstruct an original dataset. Pace discloses wherein executing the query according to the manipulated query execution graph comprises executing the query according to the manipulated query execution graph to reconstruct an original dataset (Another exemplary embodiment and/or exemplary method of the present invention is directed to the discovery method, further including the inserted step (d1) of creating an entry in an asset definition data structure, the entry having descriptions of one or more digital asset attributes of the digital asset, the asset definition data structure being a complete list of the digital assets of the computer system part that meet the selection criteria, para [0199]). Since both references teach data manipulation, it would have been obvious to one of ordinary skill in the art to combine the queries of Chowdhuri with the data sets of Pace since such a combination would provide faster translation of data objects.

Regarding claim 16, Chowdhuri discloses the computing device of claim 9, yet fails to disclose wherein the processor is further configured to perform operations such that executing the query according to the manipulated query execution graph comprises executing the query according to the manipulated query execution graph to reconstruct an original dataset. Pace discloses wherein the processor is further configured to perform operations such that executing the query according to the manipulated query execution graph comprises executing the query according to the manipulated query execution graph to reconstruct an original dataset (Another exemplary embodiment and/or exemplary method of the present invention is directed to the discovery method, further including the inserted step (d1) of creating an entry in an asset definition data structure, the entry having descriptions of one or more digital asset attributes of the digital asset, the asset definition data structure being a complete list of the digital assets of the computer system part that meet the selection criteria, para [0199]). Since both references teach data manipulation, it would have been obvious to one of ordinary skill in the art to combine the queries of Chowdhuri with the data sets of Pace since such a combination would provide faster translation of data objects.

Claims 1-20 have industrial applicability as defined by PCT Article 33(4), because the subject matter can be made or used in industry.