

## PATENT COOPERATION TREATY

From the  
INTERNATIONAL SEARCHING AUTHORITY

**PCT**

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To: Ariel Reinitz  
FisherBroyles, LLP  
445 Park Avenue, Ninth Floor  
New York, NY 10022  
United States of America

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**FOR FURTHER ACTION**

See paragraph 2 below

International application No.

PCT/US18/53169

International filing date (day/month/year)

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IPC - G06F 9/00, 17/30, 15/173 (2019.01)

CPC - G06F 17/30371, 3/067, 3/061, 12/0897, 17/30321

Applicant **IGUAZIO SYSTEMS LTD.**

## 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 and 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 66.1bis(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 P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Date of completion of this opinion  04 January 2019 (04.01.2019)	Authorized officer  Shane Thomas PCT Helpdesk: 571-272-4300 PCT OSP: 571-272-7774
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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 and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	13, 14, 29, 30, 33-35	YES
	Claims	1-12, 15-28, 31, 32	NO
Inventive step (IS)	Claims	NONE	YES
	Claims	1-35	NO
Industrial applicability (IA)	Claims	1-35	YES
	Claims	NONE	NO

2. Citations and explanations:

Claims 1-12, 15-28, 31, and 32 lack novelty under PCT Article 33(2) as being anticipated by US 2016/0217166 A1 to Iguazio Systems Ltd., (hereinafter 'Iguazio Systems').

As per claim 1, Iguazio Systems discloses a system (system architecture 100; paragraph [0033]) comprising: a processing device (a user device 102 comprising a processor 210 (user device 102); paragraph [0035]); and a memory coupled to the processing device and storing instructions that, when executed by the processing device, cause the system to perform operations (a memory 220 storing instructions connected to (coupled to) the processor 210 via a control circuit 240, the stored instructions are executed by the processor 210 causing the system architecture 100 to perform operations; paragraph [0035]-[0036]) comprising: modeling an application as a processing function (configuring (modeling) an application via an API 106 as substructure (processing function) of data objects which receives requests; paragraphs [0059], [0088], [0109]); placing the processing function at a first processing node within a processing network (placing the substructure at a first storage tier within a data storage system including a hierarchical memory by a server 120 (processing network); paragraphs [0096], [0154]); computing one or more optimization operations with respect to the processing function (processing the requests received by the substructure to determine various usage patterns (optimization operations) that optimizes the performance; paragraphs [0089], [0096]); and mobilizing the processing function from the first processing node to a second processing node within the processing network in accordance with the one or more optimization operations (transferring (mobilizing) the substructure from the first storage tier to a second storage tier within the data storage system including the hierarchical memory by the server 120 based on the various usage patterns; paragraphs [0099], [0154]).

As per claim 2, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein modeling the application comprises modeling the application as a first processing function and a second processing function (configuring the application via the API 106 comprises configuring the application as first substructure and a second substructure based on the referenced requests that are independent to each of the substructure; paragraphs [0059], [0089]).

As per claim 3, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein placing the processing function at the first processing node comprises configuring the processing function to receive one or more messages from a first message source (placing the substructure at the first storage tier within the hierarchical memory by the server 120 comprises the substructure to receive data access commands (messages) from a first application (first message source); paragraphs [0096], [0114]-[0115], [0154]).

As per claim 4, Iguazio Systems discloses the system of claim 3. Iguazio Systems further discloses wherein the one or more messages comprise one or more events (the data access commands comprises a data creation, a data modification and a data deletion (events); paragraph [0113]).

As per claim 5, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein placing the processing function at the first processing node comprises configuring the processing function to perform one or more operations with respect to a data node (placing the substructure at the first storage tier within the hierarchical memory by the server 120 comprises configuring the substructure via API 106 to perform various types of operations associated with a storage medium (data node); paragraphs [0059], [0096], [0098], [0116], [0154]).

As per claim 6, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein placing the processing function at the first processing node comprises configuring the processing function to process one or more messages received from a first message source (placing the substructure at the first storage tier within the hierarchical memory by the server 120 comprises configuring the substructure to generate responses to data access commands received from a first application; paragraphs [0096], [0114]-[0115], [0154]).

As per claim 7, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein the processing function is configured to provide one or more messages to another processing function executing within the processing network (the substructure directs the data access commands to another substructure of the data object within the data storage system including the hierarchical memory by the server 120; paragraph [0113], [0154]).

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**Supplemental Box**

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As per claim 8, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein the memory further stores instructions to cause the system to perform operations comprising receiving one or more updates associated with one or more aspects of at least one of the processing function, the first processing node, the second processing node, or the processing network (receiving notifications (updates) associated with changes to the metadata (aspects) associated with the data storage system including the hierarchical memory by the server 120; paragraphs [0068], [0154]).

As per claim 9, Iguazio Systems discloses the system of claim 8. Iguazio Systems further discloses wherein computing one or more optimization operations comprises computing the one or more optimization operations based on the one or more updates (processing the usage pattern that optimizes the performance comprises analyzing the usage patterns that optimize the performance based on the notification associated with changes; paragraphs [0068], [0089], [0096], [0116]).

As per claim 10, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein mobilizing the processing function comprises determining an improved performance of the application based on mobilization of the processing function from the first processing node to the second processing node (transferring the substructure comprises determining an improved performance of the application based on transferring the substructure from the first storage tier to the second storage tier within the data storage system including the hierarchical memory by the server 120; paragraphs [0096], [0099], [0154]).

As per claim 11, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein mobilizing the processing function comprises determining an improved performance with respect to a third processing node based on mobilization of the processing function from the first processing node to the second processing node (transferring the substructure comprises determining an improved performance with respect to an optimal storage tier (third processing node) based on transferring the substructure from the first storage tier to the second storage tier within the data storage system including the hierarchical memory by the server 120; paragraphs [0061], [0096], [0099], [0154]).

As per claim 12, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein mobilizing the processing function comprises determining an improved performance with respect to the processing network based on mobilization of the processing function from the first processing node to the second processing node (transferring the substructure comprises determining an improved performance associated with the data storage system including the hierarchical memory by the server 120 based on transferring the substructure from the first storage tier to the second storage tier within the data storage system including the hierarchical memory by the server 120; paragraphs [0096], [0099], [0154]).

As per claim 15, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein mobilizing the processing function comprises configuring the processing function as mobilized to the second processing node to request one or more messages from a first message source (transferring the substructure comprises configuring via the API 106 that the substructure is transferred to the second storage tier within the data storage system including the hierarchical memory by the server 120 to receive data access commands from the first application; paragraphs [0096], [0099], [0114]-[0115], [0154]).

As per claim 16, Iguazio Systems discloses the system of claim 1. Iguazio Systems further discloses wherein mobilizing the processing function comprises configuring the processing function as mobilized to the second processing node to perform one or more operations with respect to a data node (transferring the substructure via the API 106 to the second storage tier within the data storage system including the hierarchical memory by the server 120 to perform various types of operations associated with a storage medium (data node); paragraphs [0059], [0096], [0098], [0116], [0154]).

As per claim 17, Iguazio Systems discloses a method (system architecture 100 implementing a method; paragraph [0033], claim 1 of Iguazio) comprising: modeling an application as a processing function (configuring an application via an API 106 as substructure of data objects which receives requests; paragraphs [0059], [0088], [0109]); placing the processing function at a first processing node within a processing network (placing the substructure at a first storage tier within a data storage system including a hierarchical memory by a server 120; paragraphs [0096], [0154]); computing one or more optimization operations with respect to the processing function (processing the requests received by the substructure to determine various usage patterns that optimizes the performance; paragraphs [0089], [0096]); and mobilizing the processing function from the first processing node to a second processing node within the processing network in accordance with the one or more optimization operations (transferring the substructure from the first storage tier to a second storage tier within the data storage system including the hierarchical memory by the server 120 based on the various usage patterns; paragraphs [0099], [0154]).

As per claim 18, Iguazio Systems discloses the method of claim 17. Iguazio Systems further discloses wherein modeling the application comprises modeling the application as a first processing function and a second processing function (configuring the application via the API 106 comprises configuring the application as first substructure and a second substructure based on the referenced requests that are independent to each of the substructure; paragraphs [0059], [0089]).

As per claim 19, Iguazio Systems discloses the method of claim 17. Iguazio Systems further discloses wherein placing the processing function at the first processing node comprises configuring the processing function to receive one or more messages from a first message source (placing the substructure at the first storage tier within the hierarchical memory by the server 120 comprises the substructure to receive data access commands from a first application; paragraphs [0096], [0114]-[0115], [0154]).

As per claim 20, Iguazio Systems discloses the method of claim 19. Iguazio Systems further discloses wherein the one or more messages comprise one or more events (the data access commands comprise a data creation, a data modification and a data deletion; paragraph [0113]).

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## Supplemental Box

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As per claim 21, Iguazio Systems discloses the method of claim 17. Iguazio Systems further discloses wherein placing the processing function at the first processing node comprises configuring the processing function to perform one or more operations with respect to a data node (placing the substructure at the first storage tier within the hierarchical memory by the server 120 comprises configuring the substructure via API 106 to perform various types of operations associated with a storage medium; paragraphs [0059], [0096], [0098], [0116], [0154]).

As per claim 22, Iguazio Systems discloses the method of claim 17. Iguazio Systems further discloses wherein placing the processing function at the first processing node comprises configuring the processing function to process one or more messages received from a first message source (placing the substructure at the first storage tier within the hierarchical memory by the server 120 comprises configuring the substructure to generate responses to data access commands received from a first application; paragraphs [0096], [0114]-[0115], [0154]).

As per claim 23, Iguazio Systems discloses the method of claim 17. Iguazio Systems further discloses wherein the processing function is configured to provide one or more messages to another processing function executing within the processing network (the substructure directs the data access commands to another substructure of the data object within the data storage system including the hierarchical memory by the server 120; paragraph [0113], [0154]).

As per claim 24, Iguazio Systems discloses the method of claim 17. Iguazio Systems discloses further comprising receiving one or more updates associated with one or more aspects of at least one of the processing function, the first processing node, the second processing node, or the processing network (receiving notifications associated with changes to the metadata associated with the data storage system including the hierarchical memory by the server 120; paragraphs [0068], [0154]).

As per claim 25, Iguazio Systems discloses the method of claim 24. Iguazio Systems further discloses wherein computing one or more optimization operations comprises computing the one or more optimization operations based on the one or more updates (processing the usage pattern that optimizes the performance comprises analyzing the usage patterns that optimizes the performance based on the notification associated with changes; paragraphs [0068], [0089], [0096], [0116]).

As per claim 26, Iguazio Systems discloses the method of claim 17. Iguazio Systems further discloses wherein mobilizing the processing function comprises determining an improved performance of the application based on mobilization of the processing function from the first processing node to the second processing node (transferring the substructure comprises determining an improved performance of the application based on transferring the substructure from the first storage tier to the second storage tier within the data storage system including the hierarchical memory by the server 120; paragraphs [0096], [0099], [0154]).

As per claim 27, Iguazio Systems discloses the method of claim 17. Iguazio Systems further discloses wherein mobilizing the processing function comprises determining an improved performance with respect to a third processing node based on mobilization of the processing function from the first processing node to the second processing node (transferring the substructure comprises determining an improved performance with respect to an optimal storage tier based on transferring the substructure from the first storage tier to the second storage tier within the data storage system including the hierarchical memory by the server 120; paragraphs [0061], [0096], [0099], [0154]).

As per claim 28, Iguazio Systems discloses the method of claim 17. Iguazio Systems further discloses wherein mobilizing the processing function comprises determining an improved performance with respect to the processing network based on mobilization of the processing function from the first processing node to the second processing node (transferring the substructure comprises determining an improved performance associated with the data storage system including the hierarchical memory by the server 120 based on transferring the substructure from the first storage tier to the second storage tier within the data storage system including the hierarchical memory by the server 120; paragraphs [0096], [0099], [0154]).

As per claim 31, Iguazio Systems discloses the method of claim 17. Iguazio Systems further discloses wherein mobilizing the processing function comprises configuring the processing function as mobilized to the second processing node to request one or more messages from a first message source (transferring the substructure comprises configuring via the API 106 that the substructure is transferred to the second storage tier within the data storage system including the hierarchical memory by the server 120 to receive data access commands from the first application; paragraphs [0096], [0099], [0114]-[0115], [0154]).

As per claim 32, Iguazio Systems discloses the method of claim 17. Iguazio Systems further discloses wherein mobilizing the processing function comprises configuring the processing function as mobilized to the second processing node to perform one or more operations with respect to a data node (transferring the substructure via the API 106 to the second storage tier within the data storage system including the hierarchical memory by the server 120 to perform various types of operations associated with a storage medium; paragraphs [0059], [0096], [0098], [0116], [0154]).

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Claims 13, 14, 29, 30 and 33-35 lack an inventive step under PCT Article 33(3) as being obvious over Iguazio Systems in view of US 2012/0106398 A1 to Bertin P et al. (hereinafter 'Bertin').

As per claim 13, Iguazio Systems discloses the system of claim 1. Iguazio Systems discloses activating the instance of the processing function at the second processing node (based on the usage patterns that optimize the performance, formatting (activating) a first index (instance) to complete the request associated with the substructure at the second storage tier; paragraphs [0099]-[0100]). Iguazio Systems does not disclose wherein mobilizing the processing function comprises: marking the first processing node to reflect that the processing function is being mobilized; initiating an instance of the processing function at the second processing node; and disabling the processing function as running on the first processing node. Bertin discloses wherein mobilizing the processing function comprises: marking the first processing node to reflect that the processing function is being mobilized (on receiving the data packet, the first access node ANp (first processing node) is noted (marking) within the VAN table (to reflect that the processing function is being mobilized) that data packet has been transferred; paragraphs [0149], [0153]); initiating an instance of the processing function at the second processing node (initiating a first paging packet with counter initially at zero (instance) within the data packets at the second access node ANp; paragraph [0168]); and disabling the processing function as running on the first processing node (terminating (disabling) the session activity period of the data packet after a predetermined time received at the first access node ANp; paragraphs [0142], [0149], [0153]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Iguazio Systems to provide wherein mobilizing the processing function comprises: marking the first processing node to reflect that the processing function is being mobilized; initiating an instance of the processing function at the second processing node; and disabling the processing function as running on the first processing node, as taught by Bertin, in order to gain the advantage of providing periodic updates to the access nodes for activation and deactivation of the interfaces to avoid simultaneous transmission (See Bertin; paragraph [0133]).

As per claim 14, Iguazio Systems discloses the system of claim 1. Iguazio Systems discloses wherein mobilizing the processing function comprises: activating an instance of the processing function at the second processing node (based on the usage patterns that optimize the performance, formatting a first index to complete the request associated with the substructure at the second storage tier; paragraphs [0099]-[0100]). Iguazio Systems does not disclose wherein mobilizing the processing function comprises: disabling the processing function as running on the first processing node. Bertin discloses wherein mobilizing the processing function comprises: disabling the processing function as running on the first processing node (terminating the session activity period of the data packet after a predetermined time received at the first access node ANp; paragraphs [0142], [0149], [0153]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Iguazio Systems to provide wherein mobilizing the processing function comprises: disabling the processing function as running on the first processing node, as taught by Bertin, in order to gain the advantage of providing periodic updates to the access nodes for activation and deactivation of the interfaces to avoid simultaneous transmission (See Bertin; paragraph [0133]).

As per claim 29, Iguazio Systems discloses the method of claim 17. Iguazio Systems discloses activating the instance of the processing function at the second processing node (based on the usage patterns that optimize the performance, formatting a first index to complete the request associated with the substructure at the second storage tier; paragraphs [0099]-[0100]). Iguazio Systems does not disclose wherein mobilizing the processing function comprises: marking the first processing node to reflect that the processing function is being mobilized; initiating an instance of the processing function at the second processing node; and disabling the processing function as running on the first processing node. Bertin discloses wherein mobilizing the processing function comprises: marking the first processing node to reflect that the processing function is being mobilized (on receiving the data packet, the first access node ANp is noted within the VAN table that data packet has been transferred; paragraphs [0149], [0153]); initiating an instance of the processing function at the second processing node (initiating a first paging packet with counter initially at zero within the data packets at the second access node ANp; paragraph [0168]); and disabling the processing function as running on the first processing node (terminating the session activity period of the data packet after a predetermined time received at the first access node ANp; paragraphs [0142], [0149], [0153]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Iguazio Systems to provide wherein mobilizing the processing function comprises: marking the first processing node to reflect that the processing function is being mobilized; initiating an instance of the processing function at the second processing node; and disabling the processing function as running on the first processing node, as taught by Bertin, in order to gain the advantage of providing periodic updates to the access nodes for activation and deactivation of the interfaces to avoid simultaneous transmission (See Bertin; paragraph [0133]).

As per claim 30, Iguazio Systems discloses the method of claim 17. Iguazio Systems discloses wherein mobilizing the processing function comprises: activating an instance of the processing function at the second processing node (based on the usage patterns that optimize the performance, formatting a first index to complete the request associated with the substructure at the second storage tier; paragraphs [0099]-[0100]). Iguazio Systems does not disclose wherein mobilizing the processing function comprises: disabling the processing function as running on the first processing node. Bertin discloses wherein mobilizing the processing function comprises: disabling the processing function as running on the first processing node (terminating the session activity period of the data packet after a predetermined time received at the first access node ANp; paragraphs [0142], [0149], [0153]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system of Iguazio Systems to provide wherein mobilizing the processing function comprises: disabling the processing function as running on the first processing node, as taught by Bertin, in order to gain the advantage of providing periodic updates to the access nodes for activation and deactivation of the interfaces to avoid simultaneous transmission (See Bertin; paragraph [0133]).

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As per claim 33, Iguazio Systems discloses a non-transitory computer readable medium having instructions stored thereon that, when executed by a processing device, cause the processing device to perform operations (a non-transitory computer-readable medium having instructions encoded thereon that, when executed by a processing device, cause the processing device to perform operations; claim 32 of Iguazio Systems) comprising: modeling an application as a processing function (configuring an application via an API 106 as substructure of data objects which receives requests; paragraphs [0059], [0088], [0109]); placing the processing function at a first processing node within a processing network (placing the substructure at a first storage tier within a data storage system including a hierarchical memory by a server 120; paragraphs [0096], [0154]); computing one or more optimization operations with respect to the processing function (processing the requests received by the substructure to determine various usage patterns that optimizes the performance; paragraphs [0089], [0096]); and based on the one or more optimization operations, activating an instance of the processing function at the second processing node (based on the usage patterns that optimize the performance, formatting a first index to complete the request associated with the substructure at the second storage tier; paragraphs [0099]-[0100]). Iguazio Systems does not disclose disabling the processing function as running on the first processing node. Bertin discloses disabling the processing function as running on the first processing node (terminating the session activity period of the data packet after a predetermined time received at the first access node ANp; paragraphs [0142], [0149], [0153]). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the non-transitory computer readable medium of Iguazio Systems to provide disabling the processing function as running on the first processing node, as taught by Bertin, in order to gain the advantage of providing periodic updates to the access nodes for activation and deactivation of the interfaces to avoid simultaneous transmission (See Bertin; paragraph [0133]).

As per claim 34, Iguazio Systems, in view of Bertin, discloses the computer-readable medium of claim 33. Iguazio Systems further discloses wherein mobilizing the processing function comprises determining an improved performance with respect to a third processing node based on mobilization of the processing function from the first processing node to the second processing node (transferring the substructure comprises determining an improved performance with respect to an optimal storage tier based on transferring the substructure from the first storage tier to the second storage tier within the data storage system including the hierarchical memory by the server 120; paragraphs [0061], [0096], [0099], [0154]).

As per claim 35, Iguazio Systems, in view of Bertin, discloses the computer-readable medium of claim 33. Iguazio Systems further discloses wherein mobilizing the processing function comprises determining an improved performance with respect to the processing network based on mobilization of the processing function from the first processing node to the second processing node (transferring the substructure comprises determining an improved performance associated with the data storage system including the hierarchical memory by the server 120 based on transferring the substructure from the first storage tier to the second storage tier within the data storage system including the hierarchical memory by the server 120; paragraphs [0096], [0099], [0154]).

Claims 1-35 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used in industry.