

METHOD AND TABLE FOR INDEXING AND MANAGING NODES OR INFORMATION WITHIN A NETWORK

5 FIELD OF THE INVENTION

The present invention relates to a method for managing nodes or information in a network to enable quick retrieval and editing of information required by a user.

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BACKGROUND OF INVENTION

In a database system for storing a melange of information, it is becoming increasingly important to be able to properly organize this data so that time spent in future data retrieval and editing is minimized. This ability to quickly identify and retrieve a user's
15 desired information is especially critical especially in a commercial and especially manufacturing environment, where shorter turnaround time leads to improved productivity.

20 Hierarchical Structure

A typical structure of a database is where individual information is organised in categories, in a hierarchical structure. A disadvantage of this database structure is that firstly, the information may be presented in plurality instances where the information may
25 be categorized in a plurality of categories. While this structure is simple to implement and convenient for information having a linear relationship or parent/child relationship, when the volume of data stored becomes too huge, the rigid structure makes retrieval of information slow. Another possible problem with this structure is duplication of data. This type of structure is also not capable of providing rich semantics information.

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This structure is inefficient for managing and retrieving information having complex relationships.

Relational structure

Databases organized in a relational structure stores information as objects. Information is embedded in the relevant object stores one or more values or information. PCT/US02/30875 discusses the arc of an index structure to access hierarchical structure to access hierarchical data in a relational database system. The hierarchical index is presented in a list database table containing entries of the index and a second table that corresponds to a node in the hierarchy.

Both these tables have to be accessed before the actual information may be retrieved. As will be appreciated, this type of structure can only be used for hierarchical data where the relationship between the nodes of the structure is simple. Even so, to retrieve data, 2 tables have to accessed, which may not be operationally convenient or straightforward.

It is therefore an object of the present invention to eradicate or ameliorate one or all of the above problems.

SUMMARY OF THE INVENTION

According to the invention, there is provided a method for indexing and managing nodes within a network, said nodes each having a unique identification tag and having information, said method including the steps of providing a table having a plurality of columns and at least a row, a first column for receiving an identification tag of a source node in the network and a subsequent column for receiving a relationship information of nodes having a relationship with the source node.

Preferably, each node corresponds to an actual object in the network.

Still preferably, each object consists of at least one, or all of the following information, including an object type, a physical location, a size or any other information that may be of interest to a user.

- 5 In a preferred embodiment, the nodes having a relationship with the source node are organized together in a same row.

Preferably, each row contains the unique identification tag in a first column, and its related node relationships in the next column of the same row.

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Preferably, the table further includes more columns so as to include additional information pertaining to a source node, said additional information, including access control information, security information, and any other attributes as desired by a user.

- 15 According to another aspect of the invention, there is provided an index table for indexing and managing data within a mesh network, said index table including a first column for receiving a unique identification tag of a source node and a subsequent column for receiving a relationship information of nodes having a relationship with the source node.

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Preferably, each node corresponds to an actual object in the network.

Still preferably, each object consists of at least one, or all of the following information, including an object type, a physical location, and a size or any other information as
25 desired by a user.

Preferably, the nodes having a relationship with the source node are organized together in a same row.

- 30 Still preferably, each row contains the unique identification tag in a first column, and its related node relationships in the next column of the same row.

According to another aspect of the invention, there is provided a method of retrieving information in a mesh network from an index table of a second aspect of the present invention said method including the steps of identifying a node of interest, locating the node of interest from a first column of the index table, establishing the relationship of the nodes having a relationship as the node of interest being the source node and retrieving the node of interest from the network.

Preferably, the method further includes the step of extracting information from the node of interest.

DESCRIPTION OF THE FIGURES

In order that the present invention might be more fully understood, embodiments of the invention will be described, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 is an illustration of an example network of the present invention; and
Figure 2 is an index table according to a second aspect of the present invention.

In each of the embodiments and variations, the same reference numerals have been used for similar components, merely for ease of understanding the specification.

DETAILED DESCRIPTION OF THE INVENTION

Reference will now be made in detail to the preferred embodiments of the invention, examples of which are illustrated in the accompanying drawings. While the invention will be described in conjunction with the preferred embodiments, it will be understood that they are not intended to limit the invention to these embodiments. On the contrary, the invention is intended to cover alternatives, modifications and equivalents, which may be

included within the spirit and scope of the invention as defined by the appended claims. Furthermore, in the following detailed description of the present invention, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be obvious to one of ordinary skill of the art that the present invention may be practiced without these specific details. In other instances, well known methods, procedures, components, and features have not been described in detail as not to unnecessarily obscure aspects of the present invention.

The present invention relates to a method for indexing and increasing nodes within a network, so as to enable quick retrieval of information from a node of interest to a user.

Information is embedded in nodes or an object within a network space. To distinct each node or object from another in the network, each node or object has its own unique identification tag.

Information desired by a user is embedded in each node or objects, and these objects are placed in the network space.

Figure 1 shows an example of the random arrangement of nodes 1 to 14 which is an example embodiment of the unique identifier of a node in a network space 100.

Each node includes information, which is desired by a user. The relationship between nodes is established, and is illustrated in Figure 1 as two-headed arrows with the symbol 'R' and a number, as an example of an indication of the relationship(s) between the nodes.

The method of the present invention includes providing a table, having a plurality of columns and at least one row, a first column for receiving an identification tag of a source node in the network, and a subsequent column for receiving a relationship information of nodes having a relationship with the source node.

An example of a table built according to the method of the present invention is shown in Figure 2.

Figure 2 shows a table, or more specifically an index table 20 of the present invention.

5 The index table 20 consists of a first column 30 for receiving or inputting an identification tag 10 of the nodes or object in the network 100, and a subsequent column for receiving or inputting a relationship information of each node, or source node. Therefore, as seen in Figure 2, the second or subsequent column shows the relationship information of other nodes in relation to the source node, depicted with the header 'Node ID', in the first
10 column 30. It is to be noted that the relationship can be bi-directional or a single direction relationship. As an example, a relationship R means a relationship with node 3, and R_3 denotes an inverse relationship with node 3.

It should be appreciated that the nodes are actual objects within the network, and each
15 object would include information that is desired by a user, for example an object type, physical location, or size. While the method provides direction towards creating an index table having two columns, it is envisioned that more columns may be created or provided according to a user's desire. The subsequent columns can include other information, for example access control information, security control information, or any
20 other attributes as desired by a user.

An index table built and organized shown Figure 2 is advantageous as it leads to a more efficient search and retrieval process.

25 As a person skilled in the art will appreciate, the method of building the index table, and the resultant index table built effectively distinct the relationship information from the actual data content. Advantageously, the method taught by the present invention allows the managing of all types of data without any restriction.

30 Other advantages from the method of the present invention include the following:

- (1) User can easily manage distributed databases across different computers since the information about each object can be contained in the index table. I.e., the index table can reside in one computer while the actual objects storage is in other computers.

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- (2) It helps to save memory by only loading user required objects and its related objects. This is extremely useful when the system requires to perform loading/unloading of objects between memory and physical storage.

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- (3) Relationships between objects can be easily changed without having to modify the actual objects.

- (4) Navigation and certain search/query operation can be easily performed without having to load all the objects into the memory.

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- (5) User can check the validity of the database by simply using some check algorithms to scan through the index table.

20 According to another aspect of the invention, the method of retrieving information in a network using an index table of the present invention includes the steps of identifying a node of interest, locating the node of interest from a first column of the index table, and establishing the relationship of the nodes having a relationship as the node of interest or source node so as to locate the node in the network 100, retrieving the node of interest
25 from the network. In an alternative, the information desired is extracted from the node of interest.

As an example, when it is desirous to retrieve information from Node 9, this node may be searched and retrieved by locating Node 9 from the index table 20, and then
30 establishing the location of Node 9, by establishing the relationship of Node 9. Node 9 has relationship R_1 with Node 10. In this way, Node 9 may be easily located in the network. Once the desired Node 9 is located, information desired by a user can then be

extracted from Node 9 by any known means. As another example, to locate Node 6, the relationship established is an inverse relationship with Node 5, or in other words, R_4' . Similarly, the Node 5 can then be easily located and retrieved, and the desired information can then be extracted by any known means.

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As can be appreciated, the method of the present invention leading to a very fast and efficient means of retrieving information, with the minimal use of memory space as only the nodes or objects are loaded.

- 10 The embodiments of the invention have been advanced by way of example only, and modifications are possible within the scope of the invention as defined by the appended claims.

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CLAIMS

1. A method for indexing and managing nodes within a network, said nodes each having a unique identification tag and having information, said method including the
5 steps of
 providing a table having a plurality of columns and at least a row;
 a first column for receiving an identification tag of a source node in the network;
 and
 a subsequent column for receiving a relationship information of nodes having a
10 relationship with the source node.
2. A method according to claim 1, wherein each node corresponds to an actual object in the network.
- 15 3. A method according to claim 2, wherein each object consists of at least one, or all of the following information, including
 an object type;
 a physical location;
 a size.
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4. A method according to any one of the preceding claims, wherein the nodes having a relationship with the source node are organized together in a same row.
5. A method according to any one of the preceding claims wherein each row
25 contains the unique identification tag in a first column, and its related node relationships in the next column of the same row.
6. A method according to any one of the preceding claims, wherein the table further includes more columns so as to include additional information pertaining to a source
30 node, said additional information, including access control information, security information, and any other attributes as desired by a user.

7. An index table for indexing and managing data within a mesh network, said index table including

a first column for receiving a unique identification tag of a source node; and

5 a subsequent column for receiving a relationship information of nodes having a relationship with the source node.

8. An index table according to claim 7, wherein each node corresponds to an actual object in the network.

10 9. An index table according to claim 8, wherein each object consists of at least one, or all of the following information, including

an object type;

a physical location;

a size.

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10. An index table according to preceding claims, wherein the nodes having a relationship with the source node are organized together in a same row.

11. An index table according to preceding claims, wherein each row contains the
20 unique identification tag in a first column, and its related node relationships in the next column of the same row.

12. A method of retrieving information in a mesh network from an index table of any one of claims 7 to 11, said method including the steps of

25 identifying a node of interest;

locating the node of interest from a first column of the index table;

establishing the relationship of the nodes having a relationship as the node of interest being the source node; and

retrieving the node of interest from the network.

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13. A method according to claim 12, further including the step of extracting information from the node of interest.