200200796-1
14 FEB 2002

METHOD OF MANAGING FACILITIES INFORMATION

BACKGROUDN OF THE INVENTION

[0001] The present invention relates to a method of managing facilities information in stations or factories, such as electric power system and petroleum plant, comprising many equipments, apparatuses, devices, and parts, and particularly, to a method of managing hierarchically arranged facilities information.

[0002] In computer systems for carrying out such facilities information management, it is often adopted a method of classifying and hierarchically arranging target facilities data for easy management. For example, referring to FIG. 20, "Switch equipment V-Sub60/70G" and "Transformer equipment" are arranged under "Extra-high-tension substation", under which "VCB (vacuum circuit breaker)", "No.1 transformer", etc. are arranged for management.

[0003] In that case, management target data are arranged at joints of hierarchies (hereinafter refer to as nodes). For each node, an item for expressing its characteristic (hereinafter refer to as attribute item) is defined separately, in accordance with which data is allocated to each node. In that case, arrangement is often designed such that a node is selected to thereby display the contents of data corresponding to the selected node.

[0004] For example, referring to FIG. 21, selection of "VCB" causes display of set values or data such as "[751]152R" and "VBS-70525BF" in the attribute items such as "Instrument number" and "Type".

SUMMARY OF THE INVENTION

[0005] As will be described later in detail, when arranging data hierarchically, the hierarchy is often fixed at the stage of defining attribute items. This aims to prevent the data configuration from becoming complicated upon subsequent data creation or data input due to fixing of the hierarchies.

[0006] No problem will occur if additional data are contained in the initially assumed range of hierarchy definitions or attribute items. However, when trying to add data which departs from the hierarchy definitions, it may happen that data does not conform to any hierarchy, and thus cannot be added at a proper place.

[0007] It is, therefore, an object of the present invention to provide a method of managing facilities information, which facilitates additional registration, reference, attribute change, association, retrieval, etc. of data while managing the data hierarchically.

[0008] The present invention provides generally a method of managing information on facilities through hierarchical arrangement thereof, characterized in that a structure of managing the information is configured to: allow definition of attribute items labeled as one unity for facilities to be managed; classify the attribute items into several portions which are labeled and grouped as attribute definition groups; hierarchically arrange the facilities to be managed to allow selection of applicable attribute items from the attribute definition groups for each facility; allow definition of labels which can be made to correspond to the attribute definition groups independently from the definition; allow change of the labels made to correspond to the attribute definition groups to the facilities attribute groups; and allocate non-duplicate internal numbers to the facilities arranged hierarchically as nodes to provide a table of the attribute items with the internal number as a main key.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009 The other objects and features of the present invention will be apparent from the following description with reference to the accompanying drawings, wherein:

[0010] FIG. 1 is a table showing an embodiment of a method of managing facilities information, particularly an example of attribute definition and group definition of management information;

[0011] FIG. 2 is a schematic view showing an example of hierarchical data arrangement and attribute definitions;

[0012] FIG. 3 is a table showing an example of relationship between independent label definition and attribute item group;

[0013] FIG. 4 is a schematic view showing an example of hierarchical structure of facilities using independent labels;

[0014] FIG. 5 is a schematic view showing an example of allocation of proper numbers to nodes;

[0015] FIG. 6 is a table showing an example of contents of each table;

[0016] FIG. 7 is a flowchart showing data display on screen;

[0017] FIG. 8 is a table showing an example of reference screen;

[0018] FIG. 9 is a flowchart showing interactive data registration;

[0019] FIG. 10 is a table showing an example of selection of attribute item group;

[0020] FIG. 11 is a flowchart showing data batch registration;

[0021] FIG. 12 is a table showing an example of batch-registered data;

[0022] FIG. 13 is a table showing an example of data input;

[0023] FIG. 14 is a flowchart showing attribute item definition;

[0024] FIG. 15 is table showing an example of attribute item registration;

[0025] FIG. 16 is a table showing an example of association between attribute item group and attribute items;

[0026] FIG. 17 is a flowchart showing association between data;

[0027] FIG. 18 is a flowchart showing data retrieving;

[0028] FIG. 19 is a table showing an example of entry of retrieving conditions;

[0029] FIG. 20 is a table showing an example of hierarchical data structure;

[0030] FIG. 21 is a table showing an example of data attribute items for selected node and their contents;

[0031] FIG. 22 is a schematic view showing an example of fixing attribute items in each hierarchy; and

[0032] FIG. 23 is a schematic view showing an example of impossible addition of data.

DETAILED DESCRIPTION OF THE INVENTION

[0033] Before entering a description about the illustrative embodiment of the present invention, a problem encountered in the related art will be described in detail. As described hereinbefore, when arranging data hierarchically, the hierarchy is often fixed at the stage of defining attribute items. For example, referring to FIG. 22, three hierarchies are set: "Equipment hierarchy", "Apparatus hierarchy", and "Part hierarchy". And the attribute items are prepared for each hierarchy. "Place" and "Story" are prepared for "Equipment hierarchy", for example.

[0034] When trying to add data which departs from the hierarchy definitions, it may happen that data does not conform to any hierarchy, and thus cannot be added at a proper place. For example, referring to FIG. 23, even when trying to add management information or data comprising "System hierarchy", "Apparatus hierarchy," and "Part hierarchy" under "Equipment hierarchy" of existing hierarchical management information or data in FIG. 22, the data cannot be added unless "System hierarchy" is added to the existing data, because of fixing of the hierarchies.

[0035] Referring now to FIGS. 1-19, a method of managing facilities information embodying the present invention will be described.

[0036] 1) Management structure of facilities information

The management structure of facilities information is formed as follows:

[0037] -Attribute items are defined for target facilities to be managed.

[0038] -For definition, the attribute items are grouped as one unity, which is then labeled. For example, referring to FIG. 1, the label "Equipment"

groups "Indoor/outdoor", "Ventilating system", "Wiring system", "Salt damage", and "Corrosive gas" as attribute items.

[0039] -The labeled attribute items are classified and grouped into several portions (hereinafter refer to as attribute definition groups), which are then labeled. For example, referring to FIG. 1, the attribute definition group of "Equipment", "Panel", and "Part" belong to the group label "Common".

[0040] -Data to be managed are arranged hierarchically. For these data, attribute items conforming thereto are selected from the attribute definition groups. For example, referring to FIG. 2, a hierarchy is formed such that "Incoming panel" and "Switchboard" are arranged under data "Electric equipment", and "Auxiliary relay" and "VCB" are arranged under data "Incoming panel". For "Auxiliary relay", the label "Part" belonging to the label "Common" and the label "Relay" belonging to the label "Peculiar" are selected from the attribute definition groups. For "Electric equipment" and "Incoming panel", it is also possible not to select the attribute items as shown in the example of "Peculiar".

[0041] For each node, attribute information possessed by the node is defined in the way as described above. Moreover, the following correspondence is carried out:

[0042] -Labels are defined independently of the above definition. The labels can also be made to correspond to the attribute definition groups. For example, referring to FIG. 3, the labels "Electric" and "Machine" are independently made to correspond to the attribute definition groups "Common" and "Peculiar".

[0043] -When a label is made to correspond to an attribute definition group, change is carried out to the equipment attribute group which defines the label. For example, referring to FIG. 4, for "Electric equipment" and "Machine equipment", the equipment attribute groups which define the labels are changed.

[0044] -Non-duplicate internal numbers are allocated to the defined

nodes. For example, the numbers are allocated as shown in FIG. 5.

[0045] -The attribute items have each own independent table which forms a table with internal number as a main key. For example, referring to FIG. 6, individual tables are provided for the attribute items "Equipment", "Part", and "Switch" of "Electric".

[0046] Adoption of such management structure allows hierarchical arrangement of data and achievement of a flexible data configuration such as possibility of free movement of hierarchical data.

[0047] 2) Data reference

As to data having the above management structure of 1), the data are referred to along flow shown in FIG. 7.

[0048] At a step S1, the system hierarchically displays on the screen the data arranged hierarchically.

[0049] At a step S2, a system user selects a particular node.

[0050] At steps S3 and S4, the system acquires the internal number of the node. It also acquires attribute items to which the node belongs, i.e. it refers to a list table of the attribute items possessed by the node.

[0051] At a step S5, using the precedently acquired internal number as a key, attribute data is acquired from the table of the attribute items to which the node belongs.

[0052] At a step S6, the system displays on the screen the data acquired. FIG. 8 shows an example of this reference screen.

[0053] The above processing allows easy execution of data reference.

[0054] 3) Interactive data registration

As to data having the above management structure of 1), the data are interactively registered along flow shown in FIG. 9.

[0055] At a step S11, the system hierarchically displays on the screen the data already registered.

[0056] At a step S12, the system user selects parent data to which

he/she wants to add data, and clicks on an add button.

[0057] At a step S13, the system displays a data input window.

[0058] At a step S14, the system user selects in the data input window a label of the attribute items to which the data belongs. FIG. 10 shows an example of selection of the label "Switch" of the attribute items.

[0059] At a step S15, the system displays the attribute items selected, and makes ready for entering the contents of the data.

[0060] At a step S16, the system user enters the data in accordance with the contents of the attribute items displayed.

[0061] At a step S17, simultaneously with the system user pressing an update button, the system attaches a new internal number to the data entered, and writes the internal number and the entered data in the table of the attribute items selected.

[0062] The above processing allows easy execution of interactive data registration.

[0063] 4) Batch data registration

As to data having the above management structure of 1), the data are batch-registered along flow shown in FIG. 11.

[0064] At a step S21, the system user arranges data hierarchically, and prepares a table which describes the labels showing to which attribute items the data belong. FIG. 12 shows an example of batch-registered data.

[0065] At a step S22, the system registers the data in accordance with hierarchical arrangement and label information on the attribute items in the table.

[0066] At a step S23, the system prepares a table which describes the attribute item names for the attribute items in accordance with registered information.

[0067] At a step S24, the system user enters the data in the table for each attribute item. FIG. 13 shows an example of data input.

[0068] At a step S25, the system adds the data for each attribute item in accordance with the above table.

[0069] The above processing allows easy execution of batch data registration.

[0070] 5) Definition of the attribute item groups

As to data having the above management structure of 1), the attribute item groups are defined along flow shown in FIG. 14.

[0071] At a step S31, the system displays a screen for registering the attribute items.

[0072] At a step S32, the system user registers an attribute item to be registered in accordance with the screen. FIG. 15 shows an example of attribute item registration.

[0073] At a step S33, the system user associates the registered attribute item with the attribute items to which he/she wants to make the registered item belong. FIG. 16 shows an example of association between the registered attribute item and the attribute items. The attribute item registered here can belong to a plurality of registration items.

[0074] In the case that such registration takes place, if retrieval is carried out with no attribute items being specified and with the attribute item registered as a plurality of registration items being selected, both attribute items and registered attribute item can be a subject of retrieval.

[0075] The above processing allows easy execution of the definition of the attribute item groups of data.

[0076] 6) Data association

As to data having the above management structure of 1), association between the data is defined along flow shown in FIG. 17.

[0077] At a step S41, the system hierarchically displays the data presently registered.

[0078] At a step S42, the system user selects association source data from the data displayed hierarchically, and presses an association setting

button.

[0079] At a step S43, the system opens another window to hierarchically display the data presently registered.

[0080] At a step S44, the system user selects association target data from the hierarchy, and presses the add button.

[0081] At a step S45, the system saves associated information in accordance with the above operation.

[0082] When it is desired to do a plurality of associations, processing at the steps S44 and S45 is repeatedly carried out.

[0083] The above processing allows easy execution of association between data.

[0084] 7) Data retrieving

As to data group having the above management structure of 1), the data are retrieved along flow shown in FIG.18.

[0085] At a step S51, the system displays a retrieving window.

[0086] At a step S52, the system user selects on the retrieving window a label of the attribute items from the attribute item groups. Non-selection is also possible here.

[0087] At a step S53, an attribute item belonging to the selected attribute items is selected from a pull-down menu to set retrieving conditions. Non-setting is also allowed here. When the label of the attribute items is not selected at the step S52, all the attributes become a subject of the pull-down menu. FIG. 19 shows an example of entry of retrieving conditions.

[0088] At a step S54, retrieval is carried out in accordance with the set conditions.

[0089] At a step S55, the system displays the result of retrieval.

[0090] The above processing allows easy execution of data retrieving.

[0091] Having described the present invention in connection with the illustrative embodiment, it is noted that the present invention is not limited

thereto, and various changes and modifications can be made without departing from the scope of the present invention.

[0092] The entire teachings of Japanese Patent Application 2001-44993 filed February 21, 2001 are incorporated hereby by reference.

5

* C L M S *

WHAT IS CLAIMED IS:

1. A method of managing information on facilities through hierarchical arrangement thereof, **characterized in that**

a structure of managing the information is configured to:

allow definition of attribute items labeled as one unity for facilities to be managed;

classify the attribute items into several portions which are labeled and grouped as attribute definition groups;

hierarchically arrange the facilities to be managed to allow selection of applicable attribute items from the attribute definition groups for each facility;

allow definition of labels which can be made to correspond to the attribute definition groups independently from the definition;

allow change of the labels made to correspond to the attribute definition groups to the facilities attribute groups; and

allocate non-duplicate internal numbers to the facilities arranged hierarchically as nodes to provide a table of the attribute items with the internal number as a main key.

2. The method as specified in claim 1, characterized in that data reference in the structure is configured to: hierarchically display on a screen data hierarchically arranged; acquire the internal number of a node when selecting the node on a screen display; acquire the attribute items to which the node belongs; acquire attribute data using as a key the internal number acquired from the table of the attribute items to which the node belongs; and display the acquired data on the screen.

3. The method as specified in claim 1, characterized in that interactive data registration in the structure is configured to: hierarchically display data already registered; display a data input window when parent

data for adding data is selected; display, when selecting in the data input window the label of the attribute items to which the data belongs, the selected attribute items to make ready for entering data contents; attach a new internal number to data when the data is entered in accordance with the displayed contents of the attribute items; and write the internal number and the entered data in the table of the selected attribute items.

4. The method as specified in claim 1, characterized in that batch data registration in the structure is configured to: arrange data hierarchically; prepare a table which describes labels showing to which attribute items the data belongs; register the data in accordance with hierarchical arrangement and label information on the attribute items in the table; prepare a table which describes the attribute item name for the attribute items in accordance with the registered information; and adding data for each attribute item in accordance with the table when the data is entered in the table for the attribute items.

5. The method as described in claim 1, characterized in that definition of the attribute item groups in the structure is configured to: display a screen for registering the attribute items; and associate, when an attribute item is registered, in accordance with the screen, the registered attribute item to the attribute items to which an user wants to make the registered item belong.

6. A method as specified in claim 1, characterized in that data association in the structure is configured to: hierarchically display data presently registered; open another window when association source data is selected from the display; hierarchically display the data presently registered; and save associated information when the data to be associated is selected.

* C L M S *

7. The method as specified in claim 1, characterized in that data retrieval in the structure is configured to: display a retrieving window; select on the retrieving window a label of the attribute items from the attribute item groups; carry out retrieval in accordance with retrieving conditions when setting the conditions through selection of an attribute item belonging to the selected attribute items from a pull-down menu; and display a result of retrieval.