

METHOD AND APPARATUS FOR BACKING UP INFORMATION

TECHNICAL FIELD

[1] Embodiments of the present disclosure relate to the field of computer technology, and specifically to a method and apparatus for backing up information.

BACKGROUND

[2] With the development of information technology, massive information are present in an information system and grows rapidly with the change of time. In order to ensure the security of the information, the information system needs to back up the information in the information system to prevent the loss of the information. When the information on the information system is lost, the information system may restore the lost information through the backup.

SUMMARY

[3] Embodiments of the present disclosure provide a method and apparatus for backing up information.

[4] In a first aspect, an embodiment of the present disclosure provides a method for backing up information, including: acquiring a meta information record table of an information system at an interval of a first time period, the meta information record table recording name information of meta information saved on at least one node in the information system; sending a first meta information acquiring instruction to a node in the at least one node according to the meta information record table, the first meta information acquiring instruction being used to instruct to acquire meta information on a corresponding node; and saving, in response to receiving at least one piece of first feedback information corresponding to the first meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of first feedback information to a first storage area, the first

feedback information including meta information indicated by the first meta information acquiring instruction on the corresponding node.

[5] In some embodiments, the sending a first meta information acquiring instruction to a node in the at least one node according to the meta information record table includes: determining first distribution information of the meta information according to the meta information record table, the first distribution information comprising the name information of the meta information and a node where the meta information is located; and constructing, for the node in the at least one node, the first meta information acquiring instruction corresponding to the node according to the first distribution information.

[6] In some embodiments, the method further includes saving the meta information during the first time period, where the saving the meta information during the first time period includes: acquiring incremental information of the meta information at an interval of a second time period, the incremental information representing meta information changing during the second time period, and the second time period being less than the first time period; determining second distribution information of the meta information according to the incremental information, the second distribution information including name information of the meta information corresponding to the incremental information and a node where the meta information is located; constructing, for the node in the at least one node, a second meta information acquiring instruction corresponding to the node according to the second distribution information, the second meta information acquiring instruction being used to instruct to acquire the meta information corresponding to the incremental information on the node; and saving, in response to receiving at least one piece

of second feedback information corresponding to the second meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of second feedback information to a second storage area, the second feedback information comprising meta information indicated
5 by the second meta information acquiring instruction on the corresponding node.

[7] In some embodiments, the meta information record table further includes time information, the time information being
10 used to mark time at which the meta information is saved on the node, and the acquiring incremental information of the meta information at an interval of a second time period includes: acquiring the meta information record table, and determining the incremental information of the meta information in the meta
15 information record table according to time information corresponding to the second time period.

[8] In some embodiments, the method further includes: restoring, in response to the meta information being lost, the meta information, where the restoring, in response to the meta
20 information being lost, the meta information includes: restoring, in response to that an amount of data of the lost meta information is less than a set threshold and first memory information corresponding to the lost meta information is present, the lost meta information through the first memory
25 information; and finding and restoring, in response to that the amount of data of lost meta information is less than a set threshold and first memory information corresponding to the lost meta information is not present, the lost meta information from the second storage area through name information of the
30 lost meta information, the memory information being used to record meta information saved on the information system.

[9] In some embodiments, the restoring, in response to the meta information being lost, the meta information includes:

finding and restoring, in response to that the lost meta information is not present in the second storage area, the lost meta information from the first storage area through the name information of the lost meta information.

5 **[10]** In some embodiments, the restoring, in response to the meta information being lost, the meta information includes: finding and restoring, in response to that the amount of data of the lost meta information is greater than or equal to the set threshold, the lost meta information from the second storage
10 area through the name information of the lost meta information.

[11] In some embodiments, the restoring, in response to the meta information being lost, the meta information includes: acquiring, in response to that the amount of data of the lost meta information is greater than or equal to the set threshold
15 and the lost meta information is not saved in the first storage area and the second storage area, second memory information corresponding to the lost meta information, and restoring the lost meta information through the second memory information.

[12] In a second aspect, an embodiment of the present
20 disclosure provides an apparatus for backing up information, including: a meta information record table acquiring unit, configured to acquire a meta information record table of an information system at an interval of a first time period, the meta information record table recording name information of
25 meta information saved on at least one node in the information system; a first meta information acquiring instruction sending unit, configured to send a first meta information acquiring instruction to a node in the at least one node according to the meta information record table, the first meta
30 information acquiring instruction being used to instruct to acquire meta information on a corresponding node; and a meta information backup unit, configured to save, in response to receiving at least one piece of first feedback information

corresponding to the first meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of first feedback information to a first storage area, the first feedback information including meta information indicated by the first meta information acquiring instruction on the corresponding node.

[13] In some embodiments, the first meta information acquiring instruction sending unit includes: a first distribution information determining subunit, configured to determine first distribution information of the meta information according to the meta information record table, the first distribution information including the name information of the meta information and a node where the meta information is located; and a first meta information acquiring instruction constructing subunit, configured to construct, for the node in the at least one node, the first meta information acquiring instruction corresponding to the node according to the first distribution information.

[14] In some embodiments, the apparatus further includes a meta information saving unit, configured to save the meta information during the first time period, where the meta information saving unit includes: an incremental information acquiring subunit, configured to acquire incremental information of the meta information at an interval of a second time period, the incremental information representing meta information changing during the second time period, and the second time period being less than the first time period; a second distribution information determining subunit, configured to determine second distribution information of the meta information according to the incremental information, the second distribution information comprising name information of the meta information corresponding to the incremental information and a node where the meta information is located;

a second meta information acquiring instruction constructing subunit, configured to construct, for the node in the at least one node, a second meta information acquiring instruction corresponding to the node according to the second distribution information, the second meta information acquiring instruction being used to instruct to acquire the meta information corresponding to the incremental information on the node; and a meta information saving subunit, configured to save, in response to receiving at least one piece of second feedback information corresponding to the second meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of second feedback information to a second storage area, the second feedback information including meta information indicated by the second meta information acquiring instruction on the corresponding node.

[15] In some embodiments, the meta information record table further includes time information, the time information being used to mark time at which the meta information is saved on the node, and the incremental information acquiring subunit includes: an incremental information determining module, configured to acquire the meta information record table, and determine the incremental information of the meta information in the meta information record table according to time information corresponding to the second time period.

[16] In some embodiments, the apparatus further includes a meta information restoring unit, configured to restore, in response to the meta information being lost, the meta information, wherein the meta information restoring unit includes: a first meta information restoring subunit, configured to restore, in response to that an amount of data of the lost meta information is less than a set threshold and first memory information corresponding to the lost meta information is present, the lost meta information through the

first memory information; and find and restore, in response to that the amount of data of lost meta information is less than a set threshold and first memory information corresponding to the lost meta information is not present, the lost meta
5 information from the second storage area through name information of the lost meta information, the memory information being used to record meta information saved on the information system.

[17] In some embodiments, the meta information restoring unit
10 includes: a second meta information restoring subunit, configured to find and restore, in response to that the lost meta information is not present in the second storage area, the lost meta information from the first storage area through the name information of the lost meta information.

[18] In some embodiments, the meta information restoring unit
15 includes: a third meta information restoring subunit, configured to find and restore, in response to that the amount of data of the lost meta information is greater than or equal to the set threshold, the lost meta information from the second
20 storage area through the name information of the lost meta information.

[19] In some embodiments, the meta information restoring unit
includes: a fourth meta information restoring subunit, configured to acquire, in response to that the amount of data
25 of the lost meta information is greater than or equal to the set threshold and the lost meta information is not saved in the first storage area and the second storage area, second memory information corresponding to the lost meta information, and restore the lost meta information through the second memory
30 information.

[20] In a third aspect, an embodiment of the present disclosure provides an electronic device, including: one or more processors; and a memory, configured to store one or more

programs, where the one or more programs, when executed by the one or more processors, cause the one or more processors to perform the method according to the first aspect.

[21] In a fourth aspect, an embodiment of the present disclosure provides a computer readable medium, storing a computer program, wherein the program, when executed by a processor, implements the method according to the first aspect.

[22] According to the method and apparatus for backing up information provided by the embodiments of the present disclosure, the information record table of the information system is first acquired at the interval of the first time period, the information record table recording the name information of the meta information saved on the at least one node in the information system. Then, the first meta information acquiring instruction is sent to the node in the at least one node according to the information record table, the first meta information acquiring instruction being used to instruct to acquire the meta information on the corresponding node. Finally, when the first feedback information corresponding to the first meta information acquiring instruction is received, the first feedback information is saved to the first storage area. The technical scheme implements the backup on the data by backing up the meta information, thus reducing the amount of the data backed up, and improving the efficiency and stability of the backup of the data.

BRIEF DESCRIPTION OF THE DRAWINGS

[23] After reading detailed descriptions of non-limiting embodiments given with reference to the following accompanying drawings, other features, objectives and advantages of the present disclosure will be more apparent.

[24] Fig. 1 is a diagram of an exemplary system architecture in which embodiments of the present disclosure may be applied;

[25] Fig. 2 is a flowchart of a method for backing up information according to an embodiment of the present disclosure;

[26] Fig. 3 is a schematic diagram of an application scenario of the method for backing up information according to an embodiment of the present disclosure;

[27] Fig. 4 is a flowchart of the method for backing up information according to another embodiment of the present disclosure;

[28] Fig. 5 is a flowchart of a method for restoring information according to an embodiment of the present disclosure;

[29] Fig. 6 is a schematic structural diagram of an apparatus for backing up information according to an embodiment of the present disclosure; and

[30] Fig. 7 is a schematic structural diagram of an electronic device adapted to implement embodiments of the present disclosure.

DETAILED DESCRIPTION OF EMBODIMENTS

[31] The present disclosure will be described below in detail by combining the accompanying drawings and the embodiments. It should be appreciated that the specific embodiments described herein are merely used for explaining the relevant disclosure, rather than limiting the disclosure. In addition, it should be noted that, for the ease of description, only the parts related to the relevant disclosure are shown in the accompanying drawings.

[32] It should also be noted that the embodiments in the present disclosure and the features in the embodiments may be combined with each other on a non-conflict basis. The present disclosure will be described below in detail with reference to the accompanying drawings and in combination with the

embodiments.

[33] Fig. 1 shows an exemplary system architecture 100 in which a method for backing up information or an apparatus for backing up information according to embodiments of the present disclosure may be applied.

[34] As shown in Fig. 1, the system architecture 100 may include a master server 101, sub-servers 102, 103, 104 and 105, a master backup server 106, a slave backup server 107 and networks 108, 109 and 110. The networks 108, 109 and 110 serve as media providing a communication link between the master server 101, the sub-servers 102, 103, 104 and 105, the master backup server 106 and the slave backup server 107. The master backup server 106 may also communicate directly with the master server 101. The networks 108, 109 and 110 may include various types of connections, for example, wired or wireless communication links, or optical fiber cables.

[35] The master server 101 and the sub-servers 102, 103, 104 and 105 constitute an information system having at least one hierarchy. The master server 101 is responsible for the data management of the entire information system, and all the data information on the information system may be recorded on the master server 101. Each sub-server in the sub-servers 102, 103, 104 and 105 is responsible for corresponding data processing, and sends the data information on the sub-server to the master server 101. The master backup server 106 may be configured to save the meta information backed up by the master server 101 at an interval of a first time period. The master backup server 106 may be a Google file system (abbreviated as GFS), an advanced file system (abbreviated as AFS), a Linux cluster parallel file system or the like. The slave backup server 107 may be configured to save the meta information on the sub-servers 102, 103, 104 and 105 at an interval of a second time period. The slave backup server 107 may be

a GFS, an AFS or a Linux cluster parallel file system, alternatively, the slave backup server 107 may be other types of storage devices, which are not defined herein. Usually, the first time period is greater than the second time period. The meta information is information related to information, which is used to describe the structure, semantics, use and usage of the information. Each piece of data has corresponding meta information. The amount of data of the meta information is usually less than the amount of data of the corresponding information. Moreover, once the information is lost, etc., the information may be restored through the meta information.

[36] The each sub-server in the sub-servers 102, 103, 104 and 105 may exchange data with a terminal device or other sub-servers within a certain region, to perform related data processing. Various data processing applications (e.g., a webpage browser application, a shopping application, a search application, an instant communication tool, a mailbox client and social platform software) may be installed on the sub-servers 102, 103, 104 and 105.

[37] The sub-servers 102, 103, 104 and 105 may be hardware or software. When the sub-servers 102, 103, 104 and 105 are the hardware, the sub-servers 102, 103, 104 and 105 may be various electronic devices supporting the data processing, the electronic devices including, but not limited to, a tablet computer, a laptop portable computer and a desktop computer. When the sub-servers 102, 103, 104 and 105 is the software, the sub-servers 102, 103, 104 and 105 may be installed in the above-listed electronic devices. The sub-servers may be implemented as a plurality of pieces of software or a plurality of software modules (e.g., a plurality of pieces of software or software modules for providing a distributed service), or as a single piece of software or a single software module, which will not be specifically defined here.

[38] The master server 101 may be a server providing various kinds of services, for example, a server managing data on the sub-servers 102, 103, 104 and 105 and sending related control instructions to the sub-servers 102, 103, 104 and 105. The master server 101 may send a meta information acquiring instruction to the sub-servers 102, 103, 104 and 105, to instruct the sub-servers to upload the meta information of the data thereon. Thereafter, the master server 101 may save the acquired meta information to the master backup server 106.

[39] It should be noted that the method for backing up information provided by the embodiments of the present disclosure is generally performed by the master server 101. Correspondingly, the apparatus for backing up information is generally provided in the master server 101.

[40] It should be noted that the master server 101 and the sub-servers 102, 103, 104 and 105 may be hardware or software. When the master server 101 and the sub-servers 102, 103, 104 and 105 are the hardware, the master server 101 and the sub-servers 102, 103, 104 and 105 may be implemented as a distributed server cluster composed of a plurality of servers, or as a single server. When the master server 101 and the sub-servers 102, 103, 104 and 105 is the software, the master server 101 and the sub-servers 102, 103, 104 and 105 may be implemented as a plurality of pieces of software or a plurality of software modules (e.g., a plurality of pieces of software or software modules for providing a distributed service), or as a single piece of software or a single software module, which will not be specifically defined here.

[41] It should be appreciated that the numbers of the master servers, the sub-servers, the master backup servers, the slave backup servers and the networks in Fig. 1 are merely illustrative. Any number of master servers, sub-servers, master backup servers, slave backup servers and networks may be

provided based on actual requirements.

[42] Further referring to Fig. 2, Fig. 2 illustrates a flow 200 of a method for backing up information according to an embodiment of the present disclosure. The method for backing up information includes the following steps.

[43] Step 201, acquiring a meta information record table of an information system at an interval of a first time period.

[44] In this embodiment, an executing body (e.g., the master server 101 shown in Fig. 1) of the method for backing up information may acquire the meta information record table by means of a wired connection or a wireless connection. The meta information record table may be saved in the executing body of this embodiment, or may be saved on a meta information server or other devices. It should be noted that the wireless connection may include, but not limited to a 3G/4G connection, a WiFi connection, a Bluetooth connection, a WiMAX connection, a Zigbee connection, a UWB (ultra wideband) connection, and other wireless connections now known or developed in the future.

[45] The existing methods of the information system backing up the data generally includes the following two methods. Method 1 is to perform a mirror backup on the data in the information system every day. Method 2 is to perform the mirror backup on the data according to a set time period, and perform the backup on newly added data every day. However, the computational resources and the storage space consumed by method 1 are too large. Although the computational resources consumed by method 2 are smaller than method 1, the whole information system needs to be scanned when the backup is performed on the newly added data, which causes a large number of repeated operations corresponding to the data backed up, and affects the online service of the information system. Therefore, the efficient of the backup performed on the

data according to the existing methods is low.

[46] The executing body according to the embodiment of the present disclosure may send a request to the meta information server or other devices at the interval of the first time period, to acquire the meta information record table. The meta information record table usually records the name information of meta information saved on at least one node (e.g., which may be the sub-servers 102, 103, 104 and 105) in the information system. In practice, the amount of data on the executing body is very large, and the time of every backup of the data is long. Usually, the first time period may be two weeks, one month, two months, or the like.

[47] Step 202, sending a first meta information acquiring instruction to a node in the at least one node according to the meta information record table.

[48] The data on the node corresponds to meta information, and the meta information may be distributed on different data areas of the current node. The executing body may query the name information of the meta information on each node through the meta information record table, and send the first meta information acquiring instruction to the each node according to the name information. Here, the first meta information acquiring instruction may be used to instruct to acquire the meta information on a corresponding node.

[49] In some alternative implementations of this embodiment, the sending a first meta information acquiring instruction to a node in the at least one node according to the meta information record table may include the following steps.

[50] In the first step, first distribution information of the meta information is determined according to the meta information record table.

[51] The executing body may query the name information of the meta information in the meta information record table to determine the distribution of the meta information on the each node, thereby obtaining the first distribution information. That is, the first distribution information may include the name information of the meta information and a node where the meta information is located.

[52] In the second step, for the node in the at least one node, the first meta information acquiring instruction corresponding to the node is constructed according to the first distribution information.

[53] After obtaining the first distribution information, the executing body may construct the first meta information acquiring instruction according to the name information of the meta information on the each node, such that the corresponding node may acquire the corresponding meta information according to the first meta information acquiring instruction after receiving the first meta information acquiring instruction.

[54] Step 203, saving, in response to receiving at least one piece of first feedback information corresponding to the first meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of first feedback information to a first storage area.

[55] After receiving the first meta information acquiring instruction, the node may acquire the meta information according to the first meta information acquiring instruction, and encapsulate the meta information into the first feedback information. The first feedback information is then sent to the executing body. After the executing body receives the at least one piece of first feedback information corresponding to the first meta information acquiring instruction and sent by the node, the executing body may save the first feedback information to the first storage

area (e.g., the first storage area may be the master backup server 106). Here, the first feedback information may include the meta information indicated by the first meta information acquiring instruction on the corresponding node. In this way, this embodiment implements the backup on the data by backing up the meta information, thereby reducing the amount of data backed up, and improving the efficiency and stability of the backup on the data.

[56] Further referring to Fig. 3, which is a schematic diagram of an application scenario of the method for backing up information according to this embodiment. In the application scenario of Fig. 3, the information system includes the master server 101, the sub-server 102, the master backup server 106 and the network 108. When backing up the meta information of the information system, the master server 101 may acquire the meta information record table of the information system at the interval of the first time period. Then the master server 101 may send the first meta information acquiring instruction to the sub-server 102 according to the meta information record table. Finally, the master server 101 may save the obtained first feedback information to the master backup server 106.

[57] According to the method for backing up information provided by the above embodiment of the present disclosure, the information record table of the information system is first acquired at the interval of the first time period, the information record table recording the name information of the meta information saved on the at least one node in the information system. Then, the first meta information acquiring instruction is sent to the node in the at least one node according to the information record table, the first meta information acquiring instruction being used to instruct to acquire the meta information on the corresponding node.

Finally, when the first feedback information corresponding to the first meta information acquiring instruction is received, the first feedback information is saved to the first storage area. The technical scheme implements the backup on the data by backing up the meta information, thus reducing the amount of the data backed up, and improving the efficiency and stability of the backup of the data.

[58] Further referring to Fig. 4, Fig. 4 illustrates a flow 400 of a method for backing up information according to another embodiment of the present disclosure. The method for backing up information is used to save meta information during the first time period of the embodiment corresponding to Fig. 2, and the flow 400 includes the following steps.

[59] Step 401, acquiring incremental information of the meta information at an interval of a second time period.

[60] On the basis of the embodiment corresponding to Fig. 2, in this embodiment, an executing body (e.g., the master server 101 shown in Fig. 1) of the method for backing up information may acquire the incremental information of the meta information at the interval of the second time period. Here, the incremental information may be used to represent meta information changing during the second time period.

[61] In some alternative implementations of this embodiment, the meta information record table further includes time information, and the time information is used to mark time at which the meta information is saved on a node. The acquiring incremental information of the meta information at an interval of a second time period may include: acquiring the meta information record table, and determining the incremental information of the meta information in the meta information record table according to time information corresponding to the second time period.

[62] The meta information record table records the name

information of the meta information, and may further include the time information marking the time at which the meta information is saved on the node. The executing body may query the time information corresponding to the second time period, to determine what meta information in the meta information record table is the incremental information. As may be seen from the above description, the executing body backs up all of the meta information on the information system through the first time period. Usually, the first time period is long, and the meta information on the information system constantly changes, and thus, it is likely that the situation where the meta information is not backed up in time occurs. For example, when the first time period is one month, on the first day of every month, the executing body may start backing up all of the meta information of the information system from the time when the data is present to the previous month. This means that the new meta information appearing from the first day of this month to the last day of this month cannot be backed up in time. In order to ensure that the meta information is not lost in the information system, the executing body may further save the incremental information through the second time period. Usually, the second time period is less than the first time period. The second time period may be one day, two days, and the like.

[63] Step 402, determining second distribution information of the meta information according to the incremental information.

[64] Similar to the process of acquiring the first distribution information, the executing body may further determine the second distribution information of the meta information through the incremental information. Here, the second distribution information may include the name information of the node corresponding to the incremental

information and the node where the meta information is located.

[65] Step 403, constructing, for the node in the at least one node, a second meta information acquiring instruction corresponding to the node according to the second distribution information.

[66] Similar to the process of acquiring the first meta information acquiring instruction, the executing body may further construct the second meta information acquiring instruction corresponding to the node according to the second distribution information. Here, the second meta information acquiring instruction may be used to instruct to acquire the meta information corresponding to the incremental information on the node.

[67] Step 404, saving, in response to receiving at least one piece of second feedback information corresponding to the second meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of second feedback information to a second storage area.

[68] Similar to the process of acquiring the first feedback information, the executing body may further save the acquired second feedback information to the second storage area (e.g., the second storage area may be the slave backup server 107). Here, the second feedback information may include the meta information indicated by the second meta information acquiring instruction on the corresponding node. In this way, the meta information may be backed up during the first time period, thus improving the efficiency and stability of the backup on the meta information.

[69] Further referring to Fig. 5, Fig. 5 illustrates a flow 500 of a method for restoring information according to an embodiment of the present disclosure. In response to the meta information being lost, the method for restoring information is used to restore the meta information, and the flow 500

includes the following steps.

[70] Step 501, restoring, in response to that an amount of data of lost meta information is less than a set threshold and first memory information corresponding to the lost meta information is present, the lost meta information through the first memory information; and finding and restoring, in response to that the amount of data of lost meta information is less than a set threshold and first memory information corresponding to the lost meta information is not present, the lost meta information from a second storage area through name information of the lost meta information.

[71] A small amount of meta information may be lost. If the amount of data of the lost meta information is less than the set threshold, and the executing body can find the first memory information corresponding to the lost meta information, the executing body may restore the lost meta information through the first memory information. The first memory information usually records the latest state of the lost meta information, and the latest state of the lost meta information can be restored through the first memory information. If the first memory information corresponding to the lost meta information is not found, the executing body may find and restore the lost meta information from the second storage area through the name information of the lost meta information. As may be seen from the above description, the meta information saved in the second storage area is the meta information recently obtained. Therefore, if the corresponding first memory information is not found, the recent state of the lost meta information can also be restored through the meta information saved in the second storage area. Here, the memory information may be used to record the meta information saved on the information system. The memory information may be, for example, redundant data and disk historical data. According to

different storage media or storage approaches, the memory information may be other types of information, which will not be repeatedly described herein one by one.

[72] In some alternative implementations of this embodiment, in response to that the lost meta information is not present in the second storage area, the lost meta information is found and restored from the first storage area through the name information of the lost meta information.

[73] If the lost metadata information is not present in the second storage area, the lost meta information can only be found from the first storage area. As may be seen from the above description, the first storage area saves all the meta information existing on the information system. Therefore, the executing body may restore the lost meta information through the meta information in the first storage area.

[74] Step 502, finding and restoring, in response to that the amount of data of the lost meta information is greater than or equal to the set threshold, the lost meta information from the second storage area through the name information of the lost meta information.

[75] A large amount of meta information may alternatively be lost due to the overall damage of the disk or other causes, and the amount of data of the lost meta information is usually greater than or equal to the set threshold. At this point, the executing body may directly find and restore the lost meta information from the second storage area through the name information of the lost meta information, which helps to improve the efficiency of restoring the meta information.

[76] In some alternative implementations of this embodiment, in response to that the amount of data of the lost meta information is greater than or equal to the set threshold and the lost meta information is not saved in the first storage area and the second storage area, second memory information

corresponding to the lost meta information is acquired, and the lost meta information is restored through the second memory information.

[77] For some latest meta information, the first storage area and the second storage area may not yet back up the meta information. At this point, the executing body may directly acquire the second memory information corresponding to the lost meta information, and restore the lost meta information through the second memory information. In this way, the efficiency of restoring the meta information is improved, thereby improving the efficiency and reliability of restoring the information corresponding to the meta information.

[78] Further referring to Fig. 6, as an implementation of the method shown in the above drawings, an embodiment of the present disclosure provides an apparatus for backing up information. The embodiment of the apparatus corresponds to the embodiment of the method shown in Fig. 2, and the apparatus may be applied in various electronic devices.

[79] As shown in Fig. 6, the apparatus 600 for backing up information in this embodiment may include: a meta information record table acquiring unit 601, a first meta information acquiring instruction sending unit 602 and a meta information backup unit 603. Here, the meta information record table acquiring unit 601 is configured to acquire a meta information record table of an information system at an interval of a first time period, the meta information record table recording name information of meta information saved on at least one node in the information system. The first meta information acquiring instruction sending unit 602 is configured to send a first meta information acquiring instruction to a node in the at least one node according to the meta information record table, the first meta information acquiring instruction being used to instruct to acquire meta information on a corresponding node. The meta

information backup unit 603 is configured to save, in response to receiving at least one piece of first feedback information corresponding to the first meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of first feedback information to a first storage area, the first feedback information including meta information indicated by the first meta information acquiring instruction on the corresponding node.

[80] In some alternative implementations of this embodiment, the first meta information acquiring instruction sending unit 602 may include: a first distribution information determining subunit (not shown in the figures) and a first meta information acquiring instruction constructing subunit (not shown in the drawings). The first distribution information determining subunit is configured to determine first distribution information of the meta information according to the meta information record table, the first distribution information including the name information of the meta information and a node where the meta information is located. The first meta information acquiring instruction constructing subunit is configured to construct, for the node in the at least one node, the first meta information acquiring instruction corresponding to the node according to the first distribution information.

[81] In some alternative implementations of this embodiment, the apparatus 600 for backing up information may further include a meta information saving unit (not shown in the figures), configured to save the meta information during the first time period. The meta information saving unit may include: an incremental information acquiring subunit (not shown in the figures), a second distribution information determining subunit (not shown in the figures), a second meta information acquiring instruction constructing subunit (not shown in the

figures) and a meta information saving subunit (not shown in the figures). Here, the incremental information acquiring subunit is configured to acquire incremental information of the meta information at an interval of a second time period, the incremental information being used to represent meta information changing during the second time period, and the second time period being less than the first time period. The second distribution information determining subunit is configured to determine second distribution information of the meta information according to the incremental information, the second distribution information including name information of the meta information corresponding to the incremental information and a node where the meta information is located. The second meta information acquiring instruction constructing subunit is configured to construct, for the node in the at least one node, a second meta information acquiring instruction corresponding to the node according to the second distribution information, the second meta information acquiring instruction being used to instruct to acquire the meta information corresponding to the incremental information on the node. The meta information saving subunit is configured to save, in response to receiving at least one piece of second feedback information corresponding to the second meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of second feedback information to a second storage area, the second feedback information including meta information indicated by the second meta information acquiring instruction on the corresponding node.

[82] In some alternative implementations of this embodiment, the meta information record table may further include time information, the time information being used to mark time at which the meta information is saved on the node. The incremental information acquiring subunit may include: an incremental information determining module (not shown in the figures),

configured to acquire the meta information record table, and determine the incremental information of the meta information in the meta information record table according to time information corresponding to the second time period.

5 **[83]** In some alternative implementations of this embodiment, the apparatus 600 for backing up information may further include a meta information restoring unit (not shown in the figures), configured to restore, in response to the meta information being lost, the meta information. The meta information restoring unit
10 may include: a first meta information restoring subunit (not shown in the figures), configured to restore, in response to that an amount of data of the lost meta information is less than a set threshold and first memory information corresponding to the lost meta information is present, the lost meta information
15 through the first memory information; and find and restore, in response to that the amount of data of lost meta information is less than a set threshold and first memory information corresponding to the lost meta information is not present, the lost meta information from the second storage area through name
20 information of the lost meta information, the memory information being used to record meta information saved on the information system.

25 **[84]** In some alternative implementations of this embodiment, the meta information restoring unit may include: a second meta information restoring subunit (not shown in the figures), configured to find and restore, in response to that the lost meta information is not present in the second storage area, the lost meta information from the first storage area through the name information of the lost meta information.

30 **[85]** In some alternative implementations of this embodiment, the meta information restoring unit may include: a third meta information restoring subunit (not shown in the figures), configured to find and restore, in response to that the amount

of data of the lost meta information is greater than or equal to the set threshold, the lost meta information from the second storage area through the name information of the lost meta information.

5 **[86]** In some alternative implementations of this embodiment, the meta information restoring unit may include: a fourth meta information restoring subunit (not shown in the figures), configured to acquire, in response to that the amount of data of the lost meta information is greater than or equal to the
10 set threshold and the lost meta information is not saved in the first storage area and the second storage area, second memory information corresponding to the lost meta information, and restore the lost meta information through the second memory information.

15 **[87]** Embodiments of the present disclosure further provides an electronic device, comprising one or more processors; and a memory, configured to store one or more programs. The one or more programs, when executed by the one or more processors, cause the one or more processors to perform the method for
20 backing up information according to the above embodiments.

[88] Embodiments of the present disclosure further provides a computer readable medium, storing a computer program. The program, when executed by a processor, implements the method for backing up information according to the above embodiments.

25 **[89]** Referring to Fig. 7, Fig. 7 is a schematic structural diagram of a computer system 700 adapted to implement an electronic device (e.g., the master server 101 in Fig. 1) according to embodiments of the present disclosure. The electronic device shown in Fig. 7 is merely an example, and
30 should not bring any limitations to the functions and the scope of use of the embodiments of the present disclosure.

[90] As shown in Fig. 7, the electronic device 700 may include a processing apparatus (e.g., a central processing unit and a

graphics processing unit) 701, which may execute various appropriate actions and processes in accordance with a program stored in a read-only memory (ROM) 702 or a program loaded into a random access memory (RAM) 703 from a storage apparatus 708. The RAM 703 also stores various programs and data required by operations of the electronic device 700. The processing apparatus 701, the ROM 702 and the RAM 703 are connected to each other through a bus 704. An input/output (I/O) interface 705 is also connected to the bus 704.

[91] Usually, the following apparatuses are connected to the I/O interface 705: an input apparatus 706 including, for example, a touch screen, a touch pad, a keyboard, a mouse, a camera, a microphone, an accelerometer and a gyroscope; an output apparatus 707 including, for example, a liquid crystal display (LCD), a speaker and a vibrator; a storage apparatus 708 including, for example, a magnetic tape and a hard disk; and a communication apparatus 709. The communication apparatus 709 may allow the electronic device 700 to exchange data through a wireless communication or a wired communication with other devices. Although Fig. 7 illustrates the electronic device 700 having various apparatuses, it should be understood that it is not required to implement or possess all of the illustrated apparatuses. More or less apparatuses may be alternatively implemented or possessed. Each of the blocks shown in Fig. 7 may represent one apparatus, or may represent a plurality of apparatuses as required.

[92] In particular, according to embodiments of the present disclosure, the process described above with reference to the flow chart may be implemented in a computer software program. For example, an embodiment of the present disclosure includes a computer program product, which includes a computer program that is tangibly embedded in a machine-readable medium. The computer program includes program codes for executing the

method as illustrated in the flow chart. In such an embodiment, the computer program may be downloaded and installed from a network via the communication portion 709, or may be installed from the storage apparatus 708, or may be installed from the ROM 702. The computer program, when executed by the processing apparatus 701, implements the functions as defined by the methods of the present disclosure.

[93] It should be noted that the computer readable medium in the present disclosure may be computer readable signal medium or computer readable storage medium or any combination of the above two. An example of the computer readable storage medium may include, but not limited to: electric, magnetic, optical, electromagnetic, infrared, or semiconductor systems, apparatus, elements, or a combination of any of the above. A more specific example of the computer readable storage medium may include but is not limited to: electrical connection with one or more wire, a portable computer disk, a hard disk, a random access memory (RAM), a read only memory (ROM), an erasable programmable read only memory (EPROM or flash memory), a fibre, a portable compact disk read only memory (CD-ROM), an optical memory, a magnet memory or any suitable combination of the above. In the present disclosure, the computer readable storage medium may be any tangible medium containing or storing programs which may be used by a command execution system, apparatus or element or incorporated thereto. In the present disclosure, the computer readable signal medium may include data signal in the base band or propagating as parts of a carrier, in which computer readable program codes are carried. The propagating data signal may take various forms, including but not limited to: an electromagnetic signal, an optical signal or any suitable combination of the above. The signal medium that can be read by computer may be any computer readable medium except for the computer readable storage medium. The computer readable medium is capable of transmitting, propagating or transferring

programs for use by, or used in combination with, a command execution system, apparatus or element. The program codes contained on the computer readable medium may be transmitted with any suitable medium including but not limited to: wireless,
5 wired, optical cable, RF medium etc., or any suitable combination of the above.

[94] The computer readable medium may be the computer readable medium included in the electronic device, or a stand-alone computer readable medium not assembled into the
10 electronic device. The computer readable medium carries one or more programs. The one or more programs, when executed by the electronic device, cause the electronic device to: acquire a meta information record table of an information system at an interval of a first time period, the meta information record
15 table recording name information of meta information saved on at least one node in the information system; send a first meta information acquiring instruction to a node in the at least one node according to the meta information record table, the first meta information acquiring instruction being used to indicate
20 an acquiring of meta information on a corresponding node; and save, in response to receiving at least one piece of first feedback information corresponding to the first meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of first feedback
25 information to a first storage area, the first feedback information including meta information indicated by the first meta information acquiring instruction on the corresponding node.

[95] A computer program code for executing operations in the
30 present disclosure may be compiled using one or more programming languages or combinations thereof. The programming languages include object-oriented programming languages, such as Java, Smalltalk or C++, and also include conventional procedural

programming languages, such as "C" language or similar programming languages. The program code may be completely executed on a user's computer, partially executed on a user's computer, executed as a separate software package, partially executed on a user's computer and partially executed on a remote computer, or completely executed on a remote computer or server. In the circumstance involving a remote computer, the remote computer may be connected to a user's computer through any network, including local area network (LAN) or wide area network (WAN), or may be connected to an external computer (for example, connected through Internet using an Internet service provider).

[96] The flow charts and block diagrams in the accompanying drawings illustrate architectures, functions and operations that may be implemented according to the systems, methods and computer program products of the various embodiments of the present disclosure. In this regard, each of the blocks in the flow charts or block diagrams may represent a module, a program segment, or a code portion, said module, program segment, or code portion comprising one or more executable instructions for implementing specified logic functions. It should also be noted that, in some alternative implementations, the functions denoted by the blocks may occur in a sequence different from the sequences shown in the figures. For example, any two blocks presented in succession may be executed, substantially in parallel, or they may sometimes be in a reverse sequence, depending on the function involved. It should also be noted that each block in the block diagrams and/or flow charts as well as a combination of blocks may be implemented using a dedicated hardware-based system executing specified functions or operations, or by a combination of a dedicated hardware and computer instructions.

[97] The units involved in the embodiments of the present disclosure may be implemented by means of software or hardware.

The described units may also be provided in a processor, for example, described as: a processor, including a meta information record table acquiring unit, a first meta information acquiring instruction sending unit and a meta information backup unit. Here, the names of these units do not in some cases constitute a limitation to such units themselves. For example, the meta information backup unit may also be described as "a unit configured to for backing up information."

[98] The above description only provides an explanation of the preferred embodiments of the present disclosure and the technical principles used. It should be appreciated by those skilled in the art that the inventive scope of the present disclosure is not limited to the technical solutions formed by the particular combinations of the above-described technical features. The inventive scope should also cover other technical solutions formed by any combinations of the above-described technical features or equivalent features thereof without departing from the concept of the disclosure. Technical schemes formed by the above-described features being interchanged with, but not limited to, technical features with similar functions disclosed in the present disclosure are examples.

WHAT IS CLAIMED IS:

1. A method for backing up information, comprising:

acquiring a meta information record table of an
information system at an interval of a first time period,
5 the meta information record table recording name
information of meta information saved on at least one node
in the information system;

sending a first meta information acquiring instruction
to a node in the at least one node according to the meta
10 information record table, the first meta information
acquiring instruction being used to instruct to acquire meta
information on a corresponding node; and

saving, in response to receiving at least one piece of
first feedback information corresponding to the first meta
15 information acquiring instruction and sent by the node in
the at least one node, the at least one piece of first
feedback information to a first storage area, the first
feedback information comprising meta information indicated
by the first meta information acquiring
20 instruction on the corresponding node.

2. The method according to claim 1, wherein the sending a first
meta information acquiring instruction to a node in the at
least one node according to the meta information record
table comprises:

25 determining first distribution information of the meta
information according to the meta information record
table, the first distribution information comprising the
name information of the meta information and a node where
the meta information is located; and

30 constructing, for the node in the at least one
node, the first meta information acquiring instruction
corresponding to the node according to the first

distribution information.

3. The method according to claim 1, further comprising saving the meta information during the first time period, wherein the saving the meta information during the first time period comprises:

acquiring incremental information of the meta information at an interval of a second time period, the incremental information representing meta information changing during the second time period, and the second time period being less than the first time period;

determining second distribution information of the meta information according to the incremental information, the second distribution information comprising name information of the meta information corresponding to the incremental information and a node where the meta information is located;

constructing, for the node in the at least one node, a second meta information acquiring instruction corresponding to the node according to the second distribution information, the second meta information acquiring instruction being used to instruct to acquire the meta information corresponding to the incremental information on the node; and

saving, in response to receiving at least one piece of second feedback information corresponding to the second meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of second feedback information to a second storage area, the second feedback information comprising meta information indicated by the second meta information acquiring instruction on the corresponding node.

4. The method according to claim 3, wherein the meta

information record table further comprises time information, the time information being used to mark time at which the meta information is saved on the node, and

the acquiring incremental information of the meta information at an interval of a second time period comprises:

acquiring the meta information record table, and determining the incremental information of the meta information in the meta information record table according to time information corresponding to the second time period.

5. The method according to claim 3, further comprising restoring, in response to the meta information being lost, the meta information, wherein the restoring, in response to the meta information being lost, the meta information comprises:

restoring, in response to that an amount of data of the lost meta information is less than a set threshold and first memory information corresponding to the lost meta information is present, the lost meta information through the first memory information; and finding and restoring, in response to that the amount of data of lost meta information is less than a set threshold and first memory information corresponding to the lost meta information is not present, the lost meta information from the second storage area through name information of the lost meta information, the memory information being used to record meta information saved on the information system.

6. The method according to claim 5, wherein the restoring, in response to the meta information being lost, the meta information comprises:

finding and restoring, in response to that the lost meta

information is not present in the second storage area, the lost meta information from the first storage area through the name information of the lost meta information.

7. The method according to claim 5, wherein the restoring, in response to the meta information being lost, the meta information comprises:

finding and restoring, in response to that the amount of data of the lost meta information is greater than or equal to the set threshold, the lost meta information from the second storage area through the name information of the lost meta information.

8. The method according to claim 7, wherein the restoring, in response to the meta information being lost, the meta information comprises:

acquiring, in response to that the amount of data of the lost meta information is greater than or equal to the set threshold and the lost meta information is not saved in the first storage area and the second storage area, second memory information corresponding to the lost meta information, and restoring the lost meta information through the second memory information.

9. An apparatus for backing up information, comprising:

a meta information record table acquiring unit, configured to acquire a meta information record table of an information system at an interval of a first time period, the meta information record table recording name information of meta information saved on at least one node in the information system;

a first meta information acquiring instruction sending unit, configured to send a first meta information acquiring instruction to a node in the at least one node according to the meta information record table, the first meta

information acquiring instruction being used to instruct to acquire meta information on a corresponding node; and

a meta information backup unit, configured to save, in response to receiving at least one piece of first feedback information corresponding to the first meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of first feedback information to a first storage area, the first feedback information comprising meta information indicated by the first meta information acquiring instruction on the corresponding node.

10. The apparatus according to claim 9, wherein the first meta information acquiring instruction sending unit comprises:

a first distribution information determining subunit, configured to determine first distribution information of the meta information according to the meta information record table, the first distribution information comprising the name information of the meta information and a node where the meta information is located; and

a first meta information acquiring instruction constructing subunit, configured to construct, for the node in the at least one node, the first meta information acquiring instruction corresponding to the node according to the first distribution information.

11. The apparatus according to claim 9, further comprising a meta information saving unit, configured to save the meta information during the first time period, wherein the meta information saving unit comprises:

an incremental information acquiring subunit, configured to acquire incremental information of the meta information at an interval of a second time period, the incremental information representing meta information

changing during the second time period, and the second time period being less than the first time period;

a second distribution information determining subunit, configured to determine second distribution information of the meta information according to the incremental information, the second distribution information comprising name information of the meta information corresponding to the incremental information and a node where the meta information is located;

a second meta information acquiring instruction constructing subunit, configured to construct, for the node in the at least one node, a second meta information acquiring instruction corresponding to the node according to the second distribution information, the second meta information acquiring instruction being used to instruct to acquire the meta information corresponding to the incremental information on the node; and

a meta information saving subunit, configured to save, in response to receiving at least one piece of second feedback information corresponding to the second meta information acquiring instruction and sent by the node in the at least one node, the at least one piece of second feedback information to a second storage area, the second feedback information comprising meta information indicated by the second meta information acquiring instruction on the corresponding node.

12. The apparatus according to claim 11, wherein the meta information record table further comprises time information, the time information being used to mark time at which the meta information is saved on the node, and the incremental information acquiring subunit comprises:

an incremental information determining module,
configured to acquire the meta information record table,
and determine the incremental information of the meta
information in the meta information record table according
to time information corresponding to the second time
period.

13. The apparatus according to claim 11, further comprising a
meta information restoring unit, configured to restore, in
response to the meta information being lost, the meta
information, wherein the meta information restoring unit
comprises:

a first meta information restoring subunit, configured
to restore, in response to that an amount of data of the lost
meta information is less than a set threshold and first
memory information corresponding to the lost meta
information is present, the lost meta information through
the first memory information; and find and restore, in
response to that the amount of data of lost meta information
is less than a set threshold and first memory information
corresponding to the lost meta information is not present,
the lost meta information from the second storage area
through name information of the lost meta information, the
memory information being used to record meta information
saved on the information system.

14. The apparatus according to claim 13, wherein the meta
information restoring unit comprises:

a second meta information restoring subunit, configured
to find and restore, in response to that the lost meta
information is not present in the second storage area, the
lost meta information from the first storage area through
the name information of the lost meta information.

15. The apparatus according to claim 13, wherein the meta
information restoring unit comprises:

a third meta information restoring subunit, configured to find and restore, in response to that the amount of data of the lost meta information is greater than or equal to the set threshold, the lost meta information from the second storage area through the name information of the lost meta information.

16. The apparatus according to claim 15, wherein the meta information restoring unit comprises:

a fourth meta information restoring subunit, configured to acquire, in response to that the amount of data of the lost meta information is greater than or equal to the set threshold and the lost meta information is not saved in the first storage area and the second storage area, second memory information corresponding to the lost meta information, and restore the lost meta information through the second memory information.

17. An electronic device, comprising:

one or more processors; and

a memory, configured to store one or more programs,

wherein the one or more programs, when executed by the one or more processors, cause the one or more processors to perform the method according to any one of claims 1-8.

18. A computer readable medium, storing a computer program, wherein the program, when executed by a processor,

implements the method according to any one of claims 1-8.