Notice

DESCRIPTION CN109739690A

Backup methods and related products

[0001]

Technical Field

[0002]

The present application relates to the field of electronic technology, and in particular to a backup method and related products.

[0003]

Background Art

[0004]

With the development of science and technology, data storage and management have become more and more concerned. In order to meet the growing demand for data storage and management, data storage and management services can be provided through clusters, that is, data is backed up to a remote storage system to back up user data for a long time. Currently, there are two ways to back up data, namely synchronous backup and asynchronous backup. In synchronous backup, when the primary cluster writes data, the primary cluster will synchronously back up the data to the standby cluster. In asynchronous backup, when the primary cluster writes data, the primary cluster will delay backing up the data to the standby cluster.

Regardless of the backup method, the primary and backup clusters are required to have backup support, and they must follow the same communication protocol to facilitate data transmission, that is, they must be in the same system architecture. Since different communication protocols are used for different backup clusters, when the backup cluster is changed, the network architecture of the primary and backup clusters needs to be readjusted.

[0005]

In the prior art, the data backup method is single, the process is cumbersome, and the user experience is low.

[0006]

Summary of the invention

[0007]

The embodiments of the present application provide a backup method and related products, so as to realize data backup between a primary cluster and a backup cluster in different system frameworks, thereby increasing the data backup methods.

[0008]

In a first aspect, an embodiment of the present application provides a backup method, the method comprising:

[0009]

Obtaining an input backup plan, and extracting a backup strategy in the backup plan, wherein the backup strategy includes a backup target backup cluster and a backup mode;

[0010]

configuring parameters according to the backup strategy to establish a communication connection with the target backup cluster;

[0011]

Receive a write request from a client, extract a data identifier carried in the write request, determine a primary cluster corresponding to the data identifier, write the data to be written in the write request into the primary cluster, and back up the data to be written to the target backup cluster based on the backup method.

[0012]

In a second aspect, an embodiment of the present application provides a backup device, the backup device comprising:

[0013]

An acquisition unit, configured to acquire an input backup plan and extract a backup strategy in the backup plan, wherein the backup strategy includes a backup target backup cluster and a backup mode;

[0014]

A configuration unit, configured to configure parameters according to the backup strategy to establish a communication connection with the target backup cluster;

[0015]

The backup unit is used to receive a write request from a client, extract a data identifier carried in the write request, determine a primary cluster corresponding to the data identifier, write the data to be written in the write request into the primary cluster, and back up the data to be written to the target backup cluster based on the backup method.

[0016]

In a third aspect, an embodiment of the present application provides a device comprising a processor, a memory, a communication interface, and one or more programs, wherein the one or more programs are stored in the memory and configured to be executed by the processor, and the program includes instructions for executing the steps in the method described in the first aspect.

[0017]

In a fourth aspect, an embodiment of the present application provides a computer-readable storage medium storing a computer program for electronic data exchange, wherein the computer program enables a computer to execute the method described in the first aspect.

[0018]

In a fifth aspect, an embodiment of the present application provides a computer program product, which includes a non-transitory computer-readable storage medium storing a computer program, and the computer is operable to cause the computer to execute the method described in the first aspect.

[0019]

Implementing the embodiments of the present application has the following beneficial effects:

[0020]

It can be seen that in an embodiment of the present application, the middleware receives an input backup plan, configures parameters according to the backup plan, and thereby establishes a communication connection with a target backup cluster. When a write request is received, the middleware identifies the primary cluster to which the write request needs to be written, writes the data to be written carried in the write request to the primary cluster, and based on the backup method in the backup plan, backs up the data to be written to the target backup cluster, thereby realizing data writing and backup by the middleware. No communication connection is required between the primary cluster and the backup cluster, and there is no need for the primary cluster and the backup cluster to belong to the same network architecture. The single problem that the primary cluster and the backup cluster must follow the same network protocol during backup is solved, and the backup method is increased.

[0021]

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

In order to more clearly illustrate the technical solutions in the embodiments of the present application, the drawings required for use in the description of the embodiments will be briefly introduced below. Obviously, the drawings described below are some embodiments of the present application. For ordinary technicians in this field, other drawings can be obtained based on these drawings without paying any creative work.

[0023]

FIG1A is a schematic diagram of a network architecture of a backup method provided in an embodiment of the present application;

[0024]

FIG1B is a schematic diagram of a backup method according to an embodiment of the present application;

[0025]

FIG2 is a schematic diagram of a flow chart of another backup method provided in an embodiment of the present application;

[0026]

FIG3 is a flow chart of another backup method provided in an embodiment of the present application;

[0027]

FIG4 is a schematic diagram of the structure of a backup device provided in an embodiment of the present application;

[0028]

FIG. 5 is a block diagram of the functional units of a backup device provided in an embodiment of the present application.

[0029]

DETAILED DESCRIPTION

[0030]

The technical solutions in the embodiments of the present application will be clearly and completely described below in conjunction with the drawings in the embodiments of the present application. Obviously, the described embodiments are only part of the embodiments of the present application, rather than all of the embodiments.
Based on the embodiments in this application, all other embodiments obtained by ordinary technicians in this field without making any creative work shall fall within the scope of protection of this application.

[0031]

The terms "first", "second", "third", "fourth" and the like in the specification, claims and drawings of this application are used to distinguish different objects rather than to describe a specific order.
In addition, the terms "includes," "comprises," and "has," and any variations thereof, are intended to cover a non-exclusive inclusion.
For example, a process, method, system, product or apparatus comprising a series of steps or units is not limited to the listed steps or units, but may optionally include unlisted steps or units, or may optionally include other steps or units inherent to the process, method, product or apparatus.

[0032]

Reference herein to an "embodiment" means that a particular feature, result, or characteristic described in connection with the embodiment can be included in at least one embodiment of the present application.
The appearances of this phrase in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments.
It is understood explicitly and implicitly by those skilled in the art that the embodiments described herein may be combined with other embodiments.

[0033]

The devices in the present application may include smart phones (such as Android phones, iOS phones, Windows Phone phones, etc.), tablet computers, PDAs, laptops, mobile Internet devices MID (Mobile Internet Devices, abbreviated as: MID) or wearable devices, etc. The above devices are only examples and not exhaustive, including but not limited to the above devices. For the convenience of description, the above devices are referred to as user equipment UE (User equipment, abbreviated as: UE) in the following embodiments.
Of course, in practical applications, the user equipment is not limited to the above-mentioned forms of realization, and may also include, for example: smart vehicle terminals, computer equipment, etc.

[0034]

Below, some terms in this application are explained to facilitate understanding by those skilled in the art.

[0035]

Middleware is an independent system software or service program. Distributed application software uses middleware to share resources between different technologies.
Middleware sits on top of the client/server operating system, manages computer resources and network communications, and is software that connects two independent applications or independent systems.
Connected systems can exchange information with each other through middleware even if they have different interfaces.

[0036]

First, refer to FIG. 1A , which is a schematic diagram of a network architecture of a backup method provided in an embodiment of the present application, wherein the network architecture includes: a client 100 , a middleware 200 , a main cluster 300 , and a backup cluster 400 , wherein the main cluster 300 and the backup cluster 400 may be one or more, may be the same device, or may be different devices, and the present application does not make a sole limitation;

[0037]

The client 100 is used to send a backup plan and a write request to the middleware 200;

[0038]

The middleware 200 is used to receive the backup plan and the write request from the client 100, configure the parameters in the configuration file of the middleware 200 according to the backup plan, establish a communication connection with the standby cluster 400, extract the data identifier carried in the write request, determine the primary cluster corresponding to the data identifier, write the data to be written in the write request to the primary cluster, and back up the written data to the standby cluster 400;

[0039]

The main cluster 300 is used to receive the data to be written sent by the middleware 200 and store the data to be written;

[0040]

The standby cluster 400 is configured to receive the data to be written sent by the middleware 200 and store the data to be written.

[0041]

It can be seen that in the embodiment of the present application, the middleware 200 receives the backup plan from the client 100, configures the parameters according to the backup plan, and thus communicates with the corresponding target standby cluster 400, and then receives the write request from the client 100, extracts the data to be written of the write request, writes the data to be written to the main cluster 300, and backs up the data to be written to the target standby cluster 400, thereby realizing the writing and backup of data by the middleware, without the need for a communication connection between the main cluster and the standby cluster, and without the need for the main cluster and the standby cluster to belong to the same network architecture, which solves the single problem that the main cluster and the standby cluster must follow the same network protocol during backup, increases the backup method, and improves the user experience.

[0042]

First, refer to FIG. 1B , which is a flowchart of a backup method provided in an embodiment of the present application. The method is applied to a device, and the device is applied to a middleware. The method includes the contents shown in steps S101 to S103:

[0043]

Step S101: The middleware obtains an input backup plan and extracts a backup strategy in the backup plan, wherein the backup strategy includes a backup target backup cluster and a backup mode.

[0044]

Optionally, the middleware obtains input of the backup plan specifically including: receiving a backup plan sent from the client, wherein the backup plan is selected by the user on the visual interface of the client, for example, backup buttons are set on the visual interface of the client, each backup button corresponds to a backup plan, and when the backup button is clicked, the backup plan corresponding to the backup button is read and sent to the middleware to indicate the middleware configuration parameters.

[0045]

The target backup cluster is a remote storage system for storing backup data, which may be a Network Attached Storage (NAS) or a Distributed Storage System (DSS).

[0046]

Step S102: The middleware configures parameters according to the backup strategy to establish a communication connection with the target backup cluster.

[0047]

Optionally, the middleware configures parameters according to the backup strategy specifically including:

[0048]

Identify the device identifier of the target backup cluster, wherein the device identifier is the identification information of the device, which is used to indicate the device type. Each backup cluster has unique identification information. A mapping relationship table between the identification information and the network protocol cluster is pre-established. The network protocol cluster corresponding to the device identifier is extracted from the mapping relationship table. For example, when the target backup cluster is a NAS storage system, the corresponding network protocol cluster includes the transmission control protocol/internet protocol TCP/IP (Transmission Control Protocol/Internet Protocol, referred to as TCP/IP), the packet exchange/sequenced packet exchange protocol IPX/SPX (Internetwork Packet Exchange/Sequences Packet Exchange, referred to as: IPX/SPX), RS-485; obtain the preset communication method with the target backup cluster, determine the network protocol corresponding to the preset communication method in the network protocol cluster, for example, when the preset communication method is a gateway, that is, data is transmitted between the middleware and the target backup cluster via the network, determine that the network protocol is TCP/IP, and when the preset communication method is a wireless LAN, determine that the network protocol is IPX/SPX; therefore, the network protocol corresponding to the target backup cluster can be determined according to the mapping relationship between the device identifier, the preset communication method and the network protocol; extract the driver corresponding to the network protocol from the driver database, load the driver, and perform data backup with the target backup cluster through the network protocol; wherein, the preset communication method includes at least one of a serial port, a gateway and a wireless LAN.

[0049]

Step S103: The middleware receives a write request from the client, extracts the data identifier carried in the write request, determines the primary cluster corresponding to the data identifier, writes the data to be written in the write request into the primary cluster, and backs up the data to be written to the target backup cluster based on the backup method.

[0050]

Optionally, determining the primary cluster corresponding to the data identifier and writing the data to be written in the write request into the primary cluster specifically includes: performing a hash operation on the data identifier to obtain a hash value corresponding to the data identifier, that is, using a hash calculation to transform an input of any length into an output of a certain length through a hash algorithm, wherein the hash algorithm can be the message digest algorithm MD5 (Message-DigestAlgorithm5, abbreviated as: MD5) or the secure hash standard algorithm SHS (Secure Hash Standard) Standard, referred to as: SHS), etc., use one of the above hash algorithms to calculate the target identifier to obtain a hash value; after obtaining the hash value, perform a modulo operation on the hash value according to a preset value to obtain a target key value, that is, y=(x, b), wherein x represents the hash value, b identifies a preset value, specifically 500, 1000, 1500 or other values, y represents the target key value, and mod represents a modulo operation; determine the target main cluster corresponding to the target key value according to the mapping relationship between the key value and the main cluster, and mark the target main cluster as the main cluster corresponding to the data identifier; extract the save path carried in the write request, and write the data to be written in the write request to the storage space of the main cluster under the save path.
For example, when the saving path is E:\BaiduNetdiskDownload, the middleware saves the data to the log file of the BaiduNetdiskDownload folder of the E disk, and writes the data to be written to the main cluster.

[0051]

Furthermore, when the data to be written is written into the primary cluster, the data to be written is backed up to the backup cluster according to the backup method. Specifically, when the backup method is synchronous backup, a backup operation is performed while writing to the primary cluster, and the data to be written is synchronously backed up to the target backup cluster. If the backup method is asynchronous backup, a pre-set backup interval is obtained, and the data to be written is first written into the primary cluster. When the middleware receives a data write success response fed back by the primary cluster, a backup operation is performed after the backup interval to back up the data to be written to the target backup cluster.

[0052]

The backup interval may be 1 minute, 2 minutes, 3 minutes or other values.

[0053]

It can be seen that in the embodiment of the present application, the middleware receives an input backup plan, configures parameters according to the backup plan, and thereby establishes a communication connection with the target backup cluster. When a write request is received, the middleware identifies the primary cluster to which the write request needs to be written, writes the data to be written carried in the write request to the primary cluster, and based on the backup method in the backup plan, backs up the data to be written to the target backup cluster, thereby realizing data writing and backup by the middleware. No communication connection is required between the primary cluster and the backup cluster, and there is no need for the primary cluster and the backup cluster to belong to the same network architecture. The single problem that the primary cluster and the backup cluster must follow the same network protocol during backup is solved, and backup methods are increased. Moreover, different backup operations are performed for different backup methods, so that different backup methods can be flexibly configured according to different user needs, thereby further improving user experience.

[0054]

Optionally, in a possible example, the method includes:

[0055]

Before performing the backup operation, the data to be written is identified, and it is determined whether the data to be written contains privacy words or privacy pictures. If so, it is determined that the data to be written contains privacy information. When backing up the data to be written to the target cluster, the data to be written is encrypted, and the encrypted data is written to the target backup cluster. The encryption of the data to be written specifically includes: obtaining encryption information from the client, wherein the encryption information includes one of fingerprint information, iris information, and face ID information, and using the encryption information to encrypt the write data, thereby preventing malicious behavior from stealing the data to be written from the target backup cluster, resulting in privacy leakage, and protecting user privacy.
Moreover, the entire encryption process is carried out without the user noticing, thus improving the user experience.

[0056]

Optionally, in a possible example, after receiving a write request from the client, the method further includes:

[0057]

Extract the data to be written carried in the write request, obtain the memory of the data to be written, if the memory of the data to be written is greater than a preset threshold, when the backup mode is synchronous backup, send a prompt message to the client, the prompt message is used to prompt the middleware to send an adjustment instruction to adjust the backup mode to asynchronous backup.
The reason is that when the memory of the data to be written is too large, when synchronous backup is adopted, it is necessary to wait for the write success information fed back by the main cluster and the target backup cluster before processing the next write request. Since the memory of the proxy write data is too large, when backing up the data to be written to the target backup cluster, when synchronous backup is adopted, the time for transmitting data with the target backup cluster through the network is long, the backup is slow, and the waiting time is long. The process of writing data to the main cluster does not require network transmission (it can be written through the serial port), so the time to write to the main cluster is shorter, and when asynchronous backup is adopted, the thread that takes a long time to back up to the target backup cluster can be run in the background, and only the thread writing to the main cluster needs to be executed, that is, the backup time is equivalent to the time required to write to the main cluster, so the time to process each write request in the synchronous backup mode is shortened, which indirectly reduces the backup time, does not increase the user's waiting time, and improves the user experience.

[0058]

The preset threshold may be 2GB, 5GB, 10GB or other values.

[0059]

Refer to FIG. 2 , which is a flow chart of another backup method provided in an embodiment of the present application. The method is applied to a device, and the device is applied to a middleware. The method includes the contents shown in steps S201 to S206:

[0060]

Step S201: Obtain an input backup plan, and extract a backup strategy in the backup plan, wherein the backup strategy includes a backup target backup cluster and a backup mode.

[0061]

Step S202: configuring parameters according to the backup strategy to establish a communication connection with the target backup cluster.

[0062]

Step S203, receiving a write request from the client, extracting a data identifier carried in the write request, determining a primary cluster corresponding to the data identifier, writing the data to be written in the write request into the primary cluster, and backing up the data to be written to the target backup cluster based on the backup method.

[0063]

Step S204: receiving confirmation character ACK information for the write request fed back by the primary cluster and the target standby cluster, and determining the execution result of the write request according to the ACK information fed back by the primary cluster and the target standby cluster.

[0064]

Step S205: When the backup mode is synchronous backup, determine whether the first ACK information for the write request fed back by the primary cluster and the second ACK information for the write request fed back by the target backup cluster are received to obtain the execution result of the write request.

[0065]

Specifically, if the first ACK information for the write request fed back by the main cluster and the second ACK information for the write request fed back by the target backup cluster are received, it is determined that the write operation and the backup operation of the write request are successfully executed. The reason is that the synchronous backup method, that is, the write operation and the backup operation are a thread, and it is necessary to ensure that both operations are successfully executed, and the result of the thread is successful. If only one operation success feedback information is received, the execution result of the thread is failed. In the prior art, if the thread fails to execute, the thread will be executed sequentially or the application will be exited (that is, the next write request will not be allowed to be received). However, there will be many write requests when backing up data,

so the current method causes a long waiting time for the user, so the following method is adopted The following solution: if the first ACK information is not received, it is determined that the write operation of the write request has failed, and the target standby cluster is instructed to mark the data to be written as data to be stored. When it is determined that the main cluster has recovered to normal, a data write request is sent to the standby cluster to extract the data to be stored from the target standby cluster and write the data to be stored to the main cluster; if the second ACK information is not received, it is determined that the backup operation of the write request has failed, and the main cluster is instructed to mark the written data as data to be backed up. When it is determined that the target standby cluster has recovered to normal, a data backup request is sent to the main cluster to extract the data to be backed up from the main cluster and back up the data to be backed up to the target standby cluster.

[0066]

Step S206: When the backup mode is asynchronous backup, determine whether the third ACK information for the write request fed back by the primary cluster is received to obtain the execution result of the write request.

[0067]

Specifically, due to the asynchronous backup method, the backup operation and the write operation are two independent threads, and the execution results of the two will not affect each other. If the backup fails, the backup operation for the data to be written can be re-executed in the background until the backup operation for the data to be written is completed. Therefore, when receiving the write success information fed back by the main cluster, there is no need to wait for whether the ACK information for the write request fed back by the target backup cluster can be received. The backup operation of the data to be written can be assumed to be successful, and the next write request can be received, and the write operation and backup operation of the next request will be executed.

[0068]

It can be seen that in the embodiment of the present application, the middleware receives an input backup plan, configures parameters according to the backup plan, and thereby establishes a communication connection with the target backup cluster. When a write request is received, the middleware identifies the primary cluster to which the write request needs to be written, writes the data to be written carried in the write request to the primary cluster, and based on the backup method in the backup plan, backs up the data to be written

to the target backup cluster, thereby realizing data writing and backup by the middleware. No communication connection is required between the primary cluster and the backup cluster, and there is no need for the primary cluster and the backup cluster to belong to the same network architecture. The single problem that the primary cluster and the backup cluster must follow the same network protocol during backup is solved, and backup methods are increased. Moreover, different backup operations are performed for different backup methods, so that different backup methods can be flexibly configured according to different user needs, thereby further improving user experience.

[0069]

Refer to FIG. 3 , which is a flow chart of another backup method provided in an embodiment of the present application. The method is applied to a device, and the device is applied to a middleware. The method includes the contents shown in steps S301 to S306:

[0070]

Step S301: Obtain an input backup plan, and extract a backup strategy in the backup plan, wherein the backup strategy includes a backup target backup cluster and a backup mode.

[0071]

Step S302: configuring parameters according to the backup strategy to establish a communication connection with the target backup cluster.

[0072]

Step S303: receiving a write request from a client, extracting a data identifier carried in the write request, determining a primary cluster corresponding to the data identifier, and writing the data to be written in the write request into the primary cluster.

[0073]

Step S304: add a timestamp to the data to be written, obtain the memory of the data to be written, send storage space acquisition information to the target standby cluster to determine the remaining storage space of the target standby cluster, and receive a response from the standby cluster to the storage space acquisition information, wherein the response carries the remaining storage space of the target standby cluster.

[0074]

Step S305: If the remaining storage space is smaller than the memory for the data to be written, a deletion instruction is sent to the target standby cluster, where the deletion instruction is used to instruct the standby cluster to delete the target data in the backed-up data.

[0075]

The target data is obtained by the backup cluster performing the following operations: parsing the timestamp of the backed up data, obtaining the backup date of each backed up data, determining the backup duration of each backed up data according to the backup date, and marking the backed up data with a backup duration longer than a preset duration as the target data.

[0076]

Furthermore, the target data can also be obtained by the backup cluster performing the following operations: receiving the memory of the data to be written sent by the middleware, parsing the timestamp of the backed up data, obtaining the backup date of each backed up data, obtaining the memory of each backed up data, and calculating the memory of the backed up data in the order of the backup date; when it is determined that the memory of the backed up data is equal to or greater than the memory of the data to be written, marking the backed up data involved in the calculation of the memory as the target data.

[0077]

Step S306: upon receiving a deletion response to the deletion instruction fed back by the standby cluster, backing up the data to be written and the timestamp of the data to be written to the standby cluster based on the backup mode.

[0078]

It can be seen that in an embodiment of the present application, the middleware receives an input backup plan, configures parameters according to the backup plan, and thereby establishes a communication connection with a target standby cluster. When a write request is received, the middleware identifies the primary cluster to which the write request needs to be written, writes the data to be written carried in the write request to the primary cluster, and based on the backup method in the backup plan, backs up the data to be written to the target standby cluster, thereby realizing data writing and backup by the middleware. No communication connection is required between the primary cluster and the standby cluster,

and there is no need for the primary cluster and the standby cluster to belong to the same network architecture. The single problem that the primary cluster and the standby cluster must follow the same network protocol during backup is solved, and backup methods are added. Moreover, different backup operations are performed for different backup methods, so that different backup methods can be flexibly configured according to different user needs, further improving user experience. Moreover, before backup, a timestamp is added to the data to record the backup time. During backup, the data that has been backed up by the target standby cluster is flexibly deleted based on the timestamp, thereby freeing up space to backup new data, flexibly configuring the storage space of the target standby cluster, and solving the problem of insufficient memory.

[0079]

Consistent with the embodiments shown in FIG. 1 , FIG. 2 , and FIG. 3 , please refer to FIG. 4 , which is a schematic diagram of the structure of a backup device 400 provided in an embodiment of the present application. As shown in FIG. 4 , the device 400 includes a processor, a memory, a communication interface, and one or more programs, wherein the one or more programs are different from the one or more application programs, and the one or more programs are stored in the memory and configured to be executed by the processor, and the program includes instructions for executing the following steps;

[0080]

Obtaining an input backup plan, and extracting a backup strategy in the backup plan, wherein the backup strategy includes a backup target backup cluster and a backup mode;

[0081]

configuring parameters according to the backup strategy to establish a communication connection with the target backup cluster;

[0082]

Receive a write request from a client, extract a data identifier carried in the write request, determine a primary cluster corresponding to the data identifier, write the data to be written in the write request into the primary cluster, and back up the data to be written to the target backup cluster based on the backup method.

[0083]

In a possible example, in terms of configuring parameters according to the backup strategy to establish a communication connection with the target standby cluster, the program is specifically used to execute instructions of the following steps:

[0084]

Identify the device identifier of the target standby cluster;

[0085]

Acquire a preset communication mode with the target standby cluster;

[0086]

Determine the network protocol corresponding to the target standby cluster according to the mapping relationship between the device identifier, the preset communication mode and the network protocol;

[0087]

Extracting a driver corresponding to the network protocol from a driver database, loading the driver, and performing data backup with the target standby cluster through the network protocol;

[0088]

Wherein, the preset communication mode includes at least one of a serial port, a gateway and a wireless local area network.

[0089]

In a possible example, in terms of determining the primary cluster corresponding to the data identifier and writing the data to be written in the write request into the primary cluster, the above program is specifically used to execute instructions of the following steps:

[0090]

Performing a hash operation on the data identifier to obtain a hash value corresponding to the data identifier;

[0091]

Perform a modulo operation on the hash value according to a preset value to obtain a target key value;

[0092]

Determine a target main cluster corresponding to the target key value according to a mapping relationship between the key value and the main cluster, and mark the target main cluster as the main cluster corresponding to the data identifier;

[0093]

The save path carried in the write request is extracted, and the data to be written in the write request is written into the storage space of the primary cluster under the save path.

[0094]

In a possible example, the above program is also used to execute instructions for the following steps:

[0095]

Receive confirmation character ACK information for the write request fed back by the primary cluster and the target standby cluster, and determine the execution result of the write request according to the ACK information fed back by the primary cluster and the target standby cluster.

[0096]

In a possible example, when the backup mode is synchronous backup, in terms of determining the execution result of the write request according to the ACK information fed back by the primary cluster and the target backup cluster, the above program is specifically used to execute instructions of the following steps:

[0097]

If first ACK information for the write request fed back by the primary cluster and second ACK information for the write request fed back by the target backup cluster are received, it is determined that both the write operation and the backup operation of the write request are successfully executed;

[0098]

If the first ACK information is not received, it is determined that the write operation of the write request has failed, the target standby cluster is instructed to mark the data to be written as data to be stored, and when it is determined that the primary cluster has recovered to normal, a data write request is sent to the standby cluster to extract the data to be stored from the target standby cluster and write the data to be stored into the primary cluster;

[0099]

If the second ACK information is not received, it is determined that the backup operation of the write request has failed, and the primary cluster is instructed to mark the written data as data to be backed up. When it is determined that the target backup cluster has recovered to normal, a data backup request is sent to the primary cluster to extract the data to be backed up from the primary cluster and back up the data to be backed up to the target backup cluster.

[0100]

In a possible example, when the backup mode is asynchronous backup, in terms of determining the execution result of the write request according to the ACK information fed back by the primary cluster and the target backup cluster, the above program is specifically used to execute the following steps:

[0101]

If the third ACK information for the write request fed back by the primary cluster is received, it is determined that both the write operation and the backup operation for the write request are successful.

[0102]

In a possible example, before backing up the data to be written to the target standby cluster, the program is further used to execute instructions of the following steps:

[0103]

Adding a timestamp to the data to be written;

[0104]

In terms of backing up the data to be written to the target backup cluster based on the backup method, the above program is specifically used to execute instructions of the following steps:

[0105]

When backing up the data to be written to the target standby cluster, obtaining the memory of the data to be written, sending storage space acquisition information to the target standby cluster to determine the remaining storage space of the target standby cluster, and receiving a response from the standby cluster to the storage space acquisition information, wherein the response carries the remaining storage space of the target standby cluster;

[0106]

If the remaining storage space is smaller than the memory of the data to be written, a deletion instruction is sent to the target standby cluster, wherein the deletion instruction is used to instruct the standby cluster to delete the target data in the backed up data, wherein the target data is obtained by the standby cluster performing the following operations: parsing the timestamp of the backed up data, obtaining the backup date of each backed up data, determining the backup duration of each backed up data according to the backup date, and marking the backed up data with a backup duration longer than a preset duration as the target data;

[0107]

When receiving a deletion response to the deletion instruction fed back by the standby cluster, the to-be-written data and the timestamp of the to-be-written data are backed up to the standby cluster based on the backup mode.

[0108]

Referring to FIG. 5 , FIG. 5 shows a possible functional unit composition block diagram of an apparatus 500 for the backup method involved in the above embodiment. The apparatus 500 includes: an acquisition unit 510, a configuration unit 520, and a backup unit 530, wherein:

[0109]

The acquisition unit 510 is used to acquire the input backup plan and extract the backup strategy in the backup plan, wherein the backup strategy includes the backup target backup cluster and the backup mode;

[0110]

A configuration unit 520, configured to configure parameters according to the backup strategy to establish a communication connection with the target backup cluster;

[0111]

The backup unit 530 is used to receive a write request from a client, extract a data identifier carried in the write request, determine a primary cluster corresponding to the data identifier, write the data to be written in the write request into the primary cluster, and back up the data to be written to the target backup cluster based on the backup method.

[0112]

In a possible example, when configuring parameters according to the backup strategy to establish a communication connection with the target backup cluster, the configuration unit 520 is specifically used to: identify the device identifier of the target backup cluster; and to obtain a preset communication method with the target backup cluster; and to determine the network protocol corresponding to the target backup cluster based on a mapping relationship between the device identifier, the preset communication method and the network protocol; and to extract a driver corresponding to the network protocol from a driver database, load the driver, and perform data backup with the target backup cluster through the network protocol; wherein the preset communication method includes at least one of a serial port, a gateway and a wireless local area network.

[0113]

In a possible example, when determining the primary cluster corresponding to the data identifier and writing the data to be written in the write request into the primary cluster, the backup unit 530 is specifically used to: perform a hash operation on the data identifier to obtain a hash value corresponding to the data identifier; and perform a modulo operation on the hash value according to a preset value to obtain a target key value; and determine the target primary cluster corresponding to the target key value according to a mapping relationship between the key value and the primary cluster, and mark the target primary cluster as the primary cluster corresponding to the data identifier; and extract the save path carried in the write request, and write the data to be written in the write request to the storage space of the primary cluster under the save path.

[0114]

In a possible example, the electronic device 500 further includes a determining unit 540;

[0115]

The determination unit 540 is configured to receive confirmation character ACK information for the write request fed back by the primary cluster and the target standby cluster, and determine the execution result of the write request according to the ACK information fed back by the primary cluster and the target standby cluster.

[0116]

In a possible example, when the backup mode is synchronous backup, when determining the execution result of the write request according to the ACK information fed back by the primary cluster and the target standby cluster, the backup unit 540 is specifically used to: if first ACK information for the write request fed back by the primary cluster and second ACK information for the write request fed back by the target standby cluster are received, determine that the write operation and the backup operation of the write request are both successfully executed; and if the first ACK information is not received, determine that the write operation of the write request fails to execute, instruct the target standby cluster to mark the to-be-written data as to-be-stored data, and when it is determined that the primary cluster is restored to normal, send a data write request to the standby cluster to extract the to-be-stored data from the target standby cluster and write the to-be-stored data to the primary cluster; and if the second ACK information is not received, determine that the backup operation of the write request fails to execute, instruct the primary cluster to mark the written data as to-be-backed up data, and when it is determined that the target standby cluster is restored to normal, send a data backup request to the primary cluster to extract the to-be-backed up data from the primary cluster and back up the to-be-backed up data to the target standby cluster.

[0117]

In a possible example, when the backup mode is asynchronous backup, when determining the execution result of the write request according to the ACK information fed back by the primary cluster and the target backup cluster, the backup unit 540 is specifically used to: upon receiving the third ACK information for the write request fed back by the primary cluster, determine that both the write operation and the backup operation of the write request are successful.

[0118]

In a possible example, the electronic device 500 further includes an adding unit 550;

[0119]

Among them, the adding unit 550 is used to add a timestamp to the data to be written. When the data to be written is backed up to the target backup cluster based on the backup method, the backup unit 530 is specifically used to: when the data to be written is backed up to the target backup cluster, obtain the memory of the data to be written, send storage space acquisition information to the target backup cluster to determine the remaining storage space of the target backup cluster, receive a response from the backup cluster to the storage space acquisition information, and the response carries the remaining storage space of the target backup cluster; and if the remaining storage space is less than the memory of the data to be written, A deletion instruction is sent to the target standby cluster, where the deletion instruction is used to instruct the standby cluster to delete target data in the backed up data, where the target data is obtained by the standby cluster performing the following operations: parsing the timestamp of the backed up data, obtaining the backup date of each backed up data, determining the backup duration of each backed up data according to the backup date, and marking the backed up data with a backup duration longer than a preset duration as target data; and when a deletion response to the deletion instruction is received from the standby cluster, backing up the data to be written and the timestamp of the data to be written to the standby cluster based on the backup method.

[0120]

An embodiment of the present application also provides a computer storage medium, wherein the computer storage medium stores a computer program for electronic data exchange, and the computer program enables a computer to execute part or all of the steps of any backup method recorded in the above method embodiments.

[0121]

An embodiment of the present application also provides a computer program product, which includes a non-transitory computer-readable storage medium storing a computer program, and the computer program is operable to cause a computer to execute part or all of the steps of any backup method recorded in the above method embodiments.

[0122]

It should be noted that, for the sake of simplicity of description, the aforementioned method embodiments are all expressed as a series of action combinations, but those skilled in the art

should know that the present application is not limited to the described order of actions, because according to the present application, certain steps may be performed in other orders or simultaneously.
Secondly, those skilled in the art should also be aware that the embodiments described in the specification are all optional embodiments, and the actions and modules involved are not necessarily required for this application.

[0123]

In the above embodiments, the description of each embodiment has its own emphasis. For parts that are not described in detail in a certain embodiment, reference can be made to the relevant descriptions of other embodiments.

[0124]

In several embodiments provided in this application, it should be understood that the disclosed device can be implemented in other ways.
For example, the device embodiments described above are merely illustrative. For example, the division of the units is merely a logical function division. There may be other division methods in actual implementation. For example, multiple units or components may be combined or integrated into another system, or some features may be ignored or not executed.
Another point is that the mutual coupling or direct coupling or communication connection shown or discussed may be an indirect coupling or communication connection through some interface, device or unit, which may be electrical or other forms.

[0125]

The units described as separate components may or may not be physically separated, and the components shown as units may or may not be physical units, that is, they may be located in one place or distributed over multiple network units.
Some or all of the units may be selected according to actual needs to achieve the purpose of the solution of this embodiment.

[0126]

In addition, each functional unit in each embodiment of the present application may be integrated into one processing unit, or each unit may exist physically separately, or two or more units may be integrated into one unit.

The above integrated unit can be implemented in the form of hardware or in the form of a software program module.

[0127]

If the integrated unit is implemented in the form of a software program module and sold or used as an independent product, it can be stored in a computer-readable memory.
Based on this understanding, the technical solution of the present application, or the part that contributes to the prior art, or all or part of the technical solution can be embodied in the form of a software product. The computer software product is stored in a memory and includes a number of instructions for enabling a computer device (which may be a personal computer, server or network device, etc.) to execute all or part of the steps of the method described in each embodiment of the present application.
The aforementioned memory includes: U disk, read-only memory (ROM), random access memory (RAM), mobile hard disk, magnetic disk or optical disk and other media that can store program code.

[0128]

A person skilled in the art can understand that all or part of the steps in the various methods of the above embodiments can be completed by instructing related hardware through a program, and the program can be stored in a computer-readable memory, and the memory can include: a flash drive, a read-only memory (English: Read-Only Memory, abbreviated as: ROM), a random access memory (English: Random Access Memory, abbreviated as: RAM), a magnetic disk or an optical disk, etc.

[0129]

The embodiments of the present application are introduced in detail above. Specific examples are used in this article to illustrate the principles and implementation methods of the present application. The description of the above embodiments is only used to help understand the method and core idea of the present application. At the same time, for general technical personnel in this field, according to the idea of the present application, there will be changes in the specific implementation method and application scope. In summary, the content of this specification should not be understood as a limitation on the present application.

Notice

CLAIMS CN109739690A

1.

A backup method, characterized in that the method comprises:
Obtaining an input backup plan, and extracting a backup strategy in the backup plan, wherein the backup strategy includes a backup target backup cluster and a backup mode;
configuring parameters according to the backup strategy to establish a communication connection with the target backup cluster;
Receive a write request from a client, extract a data identifier carried in the write request, determine a primary cluster corresponding to the data identifier, write the data to be written in the write request into the primary cluster, and back up the data to be written to the target backup cluster based on the backup method.

2.

The method according to claim 1, characterized in that configuring parameters according to the backup strategy to establish a communication connection with the target backup cluster specifically comprises:
Identify the device identifier of the target standby cluster;
Acquire a preset communication mode with the target standby cluster;
Determine the network protocol corresponding to the target standby cluster according to the mapping relationship between the device identifier, the preset communication mode and the network protocol;
Extracting a driver corresponding to the network protocol from a driver database, loading the driver, and performing data backup with the target standby cluster through the network protocol;

Wherein, the preset communication mode includes at least one of a serial port, a gateway and a wireless local area network.

3.

The method according to claim 1 or 2, characterized in that determining the primary cluster corresponding to the data identifier and writing the data to be written in the write request into the primary cluster specifically comprises:
Performing a hash operation on the data identifier to obtain a hash value corresponding to the data identifier;
Perform a modulo operation on the hash value according to a preset value to obtain a target key value;
Determine a target main cluster corresponding to the target key value according to a mapping relationship between the key value and the main cluster, and mark the target main cluster as the main cluster corresponding to the data identifier;
The save path carried in the write request is extracted, and the data to be written in the write request is written into the storage space of the primary cluster under the save path.

4.

The method according to any one of claims 1 to 3, characterized in that the method further comprises:
Receive confirmation character ACK information for the write request fed back by the primary cluster and the target standby cluster, and determine the execution result of the write request according to the ACK information fed back by the primary cluster and the target standby cluster.

5.

The method according to claim 4, characterized in that when the backup mode is synchronous backup, determining the execution result of the write request according to the ACK information fed back by the primary cluster and the target backup cluster specifically includes:
If first ACK information for the write request fed back by the primary cluster and second ACK information for the write request fed back by the target backup cluster are received, it is determined that both the write operation and the backup operation of the write request are successfully executed;
If the first ACK information is not received, it is determined that the write operation of the write request has failed, the target standby cluster is instructed to mark the data to be

written as data to be stored, and when it is determined that the primary cluster has recovered to normal, a data write request is sent to the standby cluster to extract the data to be stored from the target standby cluster and write the data to be stored into the primary cluster;
If the second ACK information is not received, it is determined that the backup operation of the write request has failed, and the primary cluster is instructed to mark the written data as data to be backed up. When it is determined that the target backup cluster has recovered to normal, a data backup request is sent to the primary cluster to extract the data to be backed up from the primary cluster and back up the data to be backed up to the target backup cluster.

6.

The method according to claim 4, characterized in that when the backup mode is asynchronous backup, determining the execution result of the write request according to the ACK information fed back by the primary cluster and the target backup cluster specifically includes:
If the third ACK information for the write request fed back by the primary cluster is received, it is determined that both the write operation and the backup operation for the write request are successful.

7.

The method according to claim 1, characterized in that before backing up the data to be written to the target standby cluster, the method further comprises:
Adding a timestamp to the data to be written;
Based on the backup method, backing up the data to be written to the target backup cluster specifically includes:
When backing up the data to be written to the target standby cluster, obtaining the memory of the data to be written, sending storage space acquisition information to the target standby cluster to determine the remaining storage space of the target standby cluster, and receiving a response from the standby cluster to the storage space acquisition information, wherein the response carries the remaining storage space of the target standby cluster;
If the remaining storage space is smaller than the memory of the data to be written, a deletion instruction is sent to the target standby cluster, wherein the deletion instruction is used to instruct the standby cluster to delete the target data in the backed up data, wherein the target data is obtained by the standby cluster performing the following operations: parsing the timestamp of the backed up data, obtaining the backup date of each backed up data, determining the backup duration of each backed up data according to the backup date,

and marking the backed up data with a backup duration longer than a preset duration as the target data;
When receiving a deletion response to the deletion instruction fed back by the standby cluster, the to-be-written data and the timestamp of the to-be-written data are backed up to the standby cluster based on the backup mode.

8.

A backup device, characterized in that the backup device comprises:
An acquisition unit, configured to acquire an input backup plan and extract a backup strategy in the backup plan, wherein the backup strategy includes a backup target backup cluster and a backup mode;
A configuration unit, configured to configure parameters according to the backup strategy to establish a communication connection with the target backup cluster;
The backup unit is used to receive a write request from a client, extract a data identifier carried in the write request, determine a primary cluster corresponding to the data identifier, write the data to be written in the write request into the primary cluster, and back up the data to be written to the target backup cluster based on the backup method.

9.

A device, characterized in that it comprises a processor, a memory, a communication interface and one or more programs, wherein the one or more programs are stored in the memory and are configured to be executed by the processor, and the program includes instructions for executing the steps in any one of the methods of claims 1-7.

10.

A computer-readable storage medium, characterized in that it is used to store a computer program, wherein the computer program is executed by a processor to implement the method according to any one of claims 1 to 7.