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(54) **Cloud storage terminal device based on cloud information & cloud computing service.**

(57) The invention provides a cloud storage terminal device based on cloud information & cloud computing service. Its feature is: it consists of hard disk, control module and USB interface; the hard disk and the USB interface are connected by a control module; the hard disk is composed of main service control cluster, storage node cluster, application node cluster, computing node cluster, transmission device and output device; the control module is composed of central processing unit, memory, solid state memory, wireless network module, wired network module, VGA interface, COM interface, network interface, MC interface and SPK interface. The advantages of this invention are: the client has the lowest equipment requirements, and it is most convenient for use, intelligent collating document, automatic synchronous SkyDrive to realize the sharing of data and application between different devices.

Figure 1

# Specification

## Cloud storage terminal device based on cloud information & cloud computing service

### Technology

The invention relates to a storage terminal of computer information, that is, a kind of cloud storage terminal device based on cloud information & cloud computing service.

### Background technology

The traditional SkyDrive first appeared to supplement mailbox and instant messenger to meet the personalized needs of users. With the rise of WEB2.0, the traditional SkyDrive separates from the independent subsidiary products to form a complete product line to meet various needs of users for network storage, more demand for traditional SkyDrive by users still lies in storage and resource sharing. As part of the backup process, the backup software or system device is used to write data to a tape or automated tape library, and data is stored on the tape from disk. These tapes and their data are separated by regular backups and designated a long period of retention, usually from 10 years to infinity. When the data backup is removed from the server's disk drive, the archive tapes are sent to remote storage devices for permanent storage. The disadvantage of the tape is that you have to wait for the tape to be retrieved from the other place before you can retrieve the data, and then take time to scan the tape, find the data that needs to be recovered, and recreate the tape to store the data. In addition, it limits explosive data growth, resulting in previously reduced backup windows, limiting the ability to retain, and there is no practical means to verify the integrity of tape media and their data storage years.

The inordinate increase in data storage and the rise of Web2.0 applications have forced people to rethink storage. As data storage grows at an annual rate of 60%, companies face a dire situation: even putting in more hard drives are still unable to solve storage problems. In the storage field, until now, the path of least resistance is a temporary solution, buying more hard disk, resulting in substantial waste of money! For video surveillance data, because network video surveillance is based on the network of audio and video streaming, in a large number of audio and video streaming transmission, the performance of video surveillance management server will have a great impact, the more the data, the video monitoring management server becomes more complex in scheduling and caching management of I/O operations, which may generate the occasion of multiple cameras on a single server, and multiple servers to a back-end storage device, thus, for frequent access to storage devices as well as storage requirements for multiple cameras and multiple servers, it takes a lot of resources and affects its processing power.

# Specification

**Contents of invention**

In order to solve the problems of the background technology, the technical proposal is as follows: it is a cloud storage terminal device based on cloud information & cloud computing service. Its feature is: it consists of hard disk, control module and USB interface; the hard disk and the USB interface are connected by a control module.

The hard disk is composed of main service control cluster, storage node cluster, application node cluster, computing node cluster, transmission device and output device.

The control module is composed of central processing unit, memory, solid state memory, wireless network module, wired network module, VGA interface, COM interface, network interface, MC interface and SPK interface.

Cloud information is a large amount of data for clients that the server needs to process, which may be documents or from a wide variety of applications, local and online. Cloud computing is the product of the integration of traditional computer and network technologies, such as grid computing, distributed computing, parallel computing, utility computing, network storage, virtualization and load balancing. By distributing computing on a large number of distributed computers rather than local or remote servers, the operation of enterprise data center is more like the internet. This allows companies to switch resources to applications that require access to computers and storage systems. Cloud computing is a new method of sharing infrastructure. It manages a large number of physical resources and achieves virtualization of these resources to form a huge pool of virtualized resources. Clouds are a class of parallel and distributed systems consisting of a series of interconnected virtual computers. These virtual computers are dynamically deployed based on service level agreements (negotiated by vendors and consumers) and exist as one or more unified computing resources. Cloud computing can dynamically deploy virtual resources in accordance with the needs of users for resources and computing capabilities, without physical resource constraints. Users have all cloud based computing and application work on virtualized resources, and no need to care about what physical resources these resources are deployed on, thus users can easily change demands for computing resources. Through the application of cloud storage cluster, grid or distributed file system, a large number of a variety of different types of network storage devices are combined together through the application software to provide a system of external data storage and service access. When the core of computing and processing of cloud computing systems is the storage and management of large amounts of data, cloud computing systems need to configure a large number of storage devices, then the cloud computing system will become a cloud storage system. Compared with the traditional storage devices, cloud storage is not only a complex system of hardware, but a complex system composed of network devices, storage devices, servers, application software,

public access interfaces, access networks, and client programs. Each part takes the storage equipment as the core, provides the data storage and the service access service through the application software.

The invention has the advantages of: the client has the lowest equipment requirements, it is most convenient for use; intelligent collation of documents, automatic synchronization of SkyDrive, to achieve data sharing between different devices and applications.

**Brief description of drawings**

Figure 1: the frame structure diagram provided by the embodiment of the invention;

**Concrete implementation**

Figure 1 shows the frame structure diagram of the invention. It is a cloud storage terminal device based on cloud information & cloud computing service. Its feature is: it consists of hard disk, control module and USB interface; the hard disk and the USB interface are connected by a control module; the hard disk is composed of main service control cluster, storage node cluster, application node cluster, computing node cluster, transmission device and output device; the control module is composed of central processing unit, memory, solid state memory, wireless network module, wired network module, VGA interface, COM interface, network interface, MC interface and SPK interface. The USB interface reads and writes the hard disk through the control module, and realizes the cloud computing service on cloud information.

The resource pool layer of cloud storage terminal is a pool of resources that are similar or similar to the same type of resources, such as computing resource pool, data resource pool, etc.. Construction of resource pool is more integration and management of physical resources, such as in a standard container space to hold 2000 servers, and solve the heat fault nodes to replace problems and reduce energy consumption. The management middleware layer is responsible for managing the resources of cloud computing, and scheduling a number of application tasks, so that resources can provide services efficiently and securely. The service oriented architecture layer encapsulates cloud computing capabilities into standard WebServices services, and incorporates into the service-oriented architecture layer system for management and use, including service interfaces, service registrations, service look ups, service access, and service work flows, etc.. The management middleware layer and the resource pool layer are the most critical part of cloud computing technology, and the functionality of the service oriented architecture layer is more dependent on external facilities. The user interaction interface provides access interfaces to the application in WebServices mode to obtain user requirements. The service directory is a list of

services that users can access. The system management module is responsible for managing and allocating all available resources, and the core is load balancing. The configuration tool is responsible for preparing the task run time environment on the assigned nodes. The monitoring module is responsible for monitoring the running state of the nodes and completing the statistics of the nodes used by the users. The implementation process is not complicated, the user interface allows the user to call a service from the directory, after the request is passed to the system management module, it will allocate the appropriate resources for the user, and then invoke the configuration tool to prepare the operating environment for the user.

Cloud computing divides the entire system's nodes into three categories: Client, master server, and data block server. The client is the access interface provided to the application, which is a set of dedicated interfaces that do not conform to the POSIX specification and are provided in the form of Library files. The application calls these library functions directly and links them to the library. The master server is the management node, which has only one logic. It saves the metadata of the system, manages the entire file system, and is the brain in the file system. The data block server is responsible for specific storage tasks. The data is stored on the data block server in the form of files, and the number of data block servers can be more than one, and the number of them directly determines the size of the system. The system divides the files into blocks of fixed size. The default is 64MB, each of which is called data block, and each block has a corresponding index number.

When accessing the system, the client first accesses the main server node, obtains the block server information to be communicated with them, then accesses the data blocks server directly yo complete the data access. This design method achieves the separation of control flow and data flow. There is only a flow of control between the client and the host server, without data flow, which greatly reduces the load on the master server, making it not a bottleneck for system performance. The data flow is transmitted directly between the client and the data block server, at the same time, as the file is divided into several data blocks for distributed storage, the client can access several data block servers at the same time, so that the whole system is highly parallel, and the overall performance of the system is improved.

Storage layer is the most basic part of cloud storage, the device can be FC fiber channel storage device, NAS and iSCSI and other IP storage devices, storage devices in cloud storage are often large and distributed across different regions, and are connected to each other via Wan, Internet, or FC fibre channel networks. On the storage device, there is a unified storage device management system, which can realize the logical virtualization management of storage devices, multi link redundant management, and the status monitoring and fault maintenance of hardware equipment.

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The basic management layer is the most central part of cloud storage and the most elusive part of cloud storage. The basic management layer realizes the cooperation between multiple storage devices in cloud storage by cluster, distributed file system, grid computing and so on to provide multiple storage devices to provide the same service externally, and greater, stronger, and better data access performance. CDN content distribution system and data encryption technology can ensure that data in cloud storage not to be accessed by unauthorized users, at the same time, through data backup and disaster recovery technology and other measures, it can ensure that the data in the cloud storage will not be lost, as well as the safety and stability of cloud storage itself.

Application interface layer is the most flexible part of cloud storage. Different cloud storage operators can develop different application service interfaces and provide different application services according to the actual business type. For example, video monitoring application platform, video on demand application platform, network hard disk reference platform and remote data backup application platform, etc.. In order to realize read and write access control, in addition to encrypting and requiring encryption, data needs a private key pair used to encrypt encrypted data and to validate signature results.

Any authorized user in the access layer can log into the cloud storage system through standard public application interfaces and enjoy cloud storage services. If the cloud storage operating unit is different, the access type and access method provided are also different.

When using a hard disk, the upload process is: Select the local file to upload, when in upload operation, it is required to firstly send file information and other information to upload to master server, after the server receives the file information, it will divide them into pieces and fixed size blocks according to the size of the file. When each block is created, the server will assign a constant, globally unique block handle to it to identify it, the block server stores the block as a Linux file on the file system hard disk and reads block data based on the specified block handle and byte range. Then the storage node status is judged according to the node information provided by the monitoring system, and the file blocks are evenly distributed to each node; finally, insert file information and block information into the database, and the server sends the file block information to the client in XML format, at this time, the client sets up a file block queue for each storage node and uploads the file block to the corresponding node in parallel. After each receive of a block of file, then the storage node sends a confirmation message to the server. The server changes the status of the file block to 1 in the database to indicate that it has been uploaded successfully. When all the files are uploaded successfully, the server changes the status of the file in the database to 1. When the server monitors the information in real time and discovers that a node is invalid, it immediately redistributes the files being uploaded.

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The download process is: select the file you want to download and send a download request to the server, when the server receives the download request, it looks up the block information of the file from the database. When a node wants to search for resources, it will send search request with the identity of the search resource to the central server, and the central server is responsible for retrieving the resource index and informing the resource requester of the nodes and paths that store the information. The server sends the file block information to the client in XML format. The client creates a thread for each storage node based on the received file block information and downloads the file block in parallel to the temporary folder of local computer. After the client has downloaded all the file blocks, it will be integrated into a complete file and the block of files will be deleted. When the server monitors the information in real time and discovers that a node fails, the part of the file being downloaded will be re allocated immediately. When selecting a suitable node from the data node and issuing a read request in parallel, the read request can be for different blocks or different parts of the same block, but not the same part of the same block. Different requests willbe typically sent to different data nodes. Different data nodes will make content aggregation to display to users after receiving the data.

# Patentansprüche

1. Es handelt sich um ein Cloud-Speicherendgerät, das auf einem Cloud-Daten- und Cloud-Computing-Dienst basiert. Es ist dadurch gekennzeichnet, dass es aus einer Festplatte, einem Steuerungsmodul und einer USB-Schnittstelle besteht; die Festplatte und die USB-Schnittstelle sind über ein Steuerungsmodul miteinander verbunden.

# Drawings

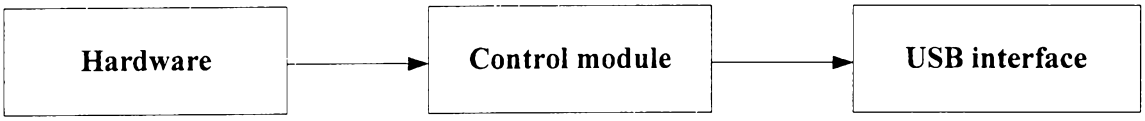


Figure 1

# Abstract

The invention provides a cloud storage terminal device based on cloud information & cloud computing service. Its feature is: it consists of hard disk, control module and USB interface; the hard disk and the USB interface are connected by a control module; the hard disk is composed of main service control cluster, storage node cluster, application node cluster, computing node cluster, transmission device and output device; the control module is composed of central processing unit, memory, solid state memory, wireless network module, wired network module, VGA interface, COM interface, network interface, MC interface and SPK interface. The advantages of this invention are: the client has the lowest equipment requirements, and it is most convenient for use, intelligent collating document, automatic synchronous SkyDrive to realize the sharing of data and application between different devices.