Analysis and Research on Spatial Data Storage Model Based on Cloud Computing Platform

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Abstract: In this paper, the data processing and storage characteristics of cloud computing are analyzed and studied. On this basis, a cloud computing data storage model based on BP neural network is proposed. In this data storage model, it can carry out the choice of server cluster according to the different attributes of the data, so as to complete the spatial data storage model with load balancing function, and have certain feasibility and application advantages.

1. Introduction
China's current use of the storage system does not weigh the spatial data association and the characteristics of distributed storage, so in this type of storage system, it cannot be spatial data categories of accurate division, and difficult to do reasonable data differentiation. Therefore, in the case of relatively large amount of data, this cluster-based storage model is difficult to achieve effective management of data information, and even lead to data read and write bottlenecks. And intelligent cloud computing storage system has a good adaptive characteristics, and can fully meet the various information and data processing needs.

2. Brief Analysis on Application Advantages of Data Storage System Based on Cloud Computing Platform
Cloud computing refers to the use of the network's own computing power, to replace the software original installed on their own computer, or replace the original data which will be stored on the hard disk related work. With the help of the network to carry out the operation of the process, it will be able to file information stored directly in the huge virtual storage space. In addition to cloud computing on the basis of this can also be combined with a variety of network services in the network server above the relevant information storage, and then through the browser to carry out the information browsing and access. Therefore, the essence of cloud computing is for some of the dynamic changes to the relevant access to resources and services to provide a reasonable, and through the rational use of computer idle resources to enhance the calculation of large data and storage efficiency [1].

Cloud computing platform which based on the data storage system in the specific application process, it also has the following advantages: ① to achieve the data storage deployment of intelligent and adaptive development, and can complete all the data and information resources, unified coordination and management work. ② can make the reading and writing of data and storage efficiency be further improved, and through the virtualization algorithm to achieve the efficient use of storage space and data reallocation work, so that the physical storage space can make the utilization further upgrade, on the other hand can also have a good load balancing and fault redundancy. ③ cloud computing based on the data storage system can also achieve large-scale effects and flexibility.
to expand the function, which can also make their own operating and maintenance costs are effectively reduced, and to maximize the effectiveness of a variety of network resources issued [2].

Therefore, the data storage management model based on cloud computing spatial can achieve a substantial change in the nature of storage on the basis of effective amplification in the data storage capacity. In recent years, with the development of information technology and cloud computing computing continues, making the data storage system is also the specific application process will be directly related to all Internet users. With the rapid increase in the number of Internet users, its storage performance for the throughput also put forward higher requirements, which also need to expand the data storage capacity in the process, making its throughput have also be further growth. At the present stage of cloud computing data storage system development process, it also needs to further enhance the durability of data storage, and requires the system to data migration and data fault tolerance in the process of fully guarantee the integrity and consistency of these data, so that can achieve a good data storage effect, and give users a more good application experience.

3. Construction of stand-alone and distributed platform

In the process of building the spatial data storage platform, it can also obtain the good spatial data structure effect through the stand-alone and distributed platform construction mode. Which distributed platform mainly needs to use five virtual machines, and need to run the system to the virtual machine. This also requires the name of each virtual machine and the IP address of a reasonable configuration, and requires each machine above has the same name with the user. At present, there are three main types of distributed storage architecture: ① physical storage centralized: the storage model in the selection of the storage node is the main application of the multi-instance approach. (2) distributed storage with a central controller: the storage model is mainly metadata server and storage node these two roles, and to complete the metadata and data block file separate storage [3]. In this storage mode, the metadata server can effectively maintain the IP state information of the storage node on the basis of saving the file metadata. ③ distributed storage: the storage model is a decentralized and fully symmetric architecture, in the whole system also contains only storage node this role, and can not be metadata and data blocks of the effective distinction.

The traditional spatial data storage work is concentrated in a computer above to carry out, which also led to its calculation results and storage results have some limitations, and lead to that in the actual storage process once the storage data can be increased, its storage efficiency will be a significant decline. In the case of distributed storage space data storage, the spatial data volume, the network endorsement and the size of the computer cluster are closely related to the time required for data storage. Computer cluster based on cloud computing platform generally has good dynamic scalability, its relatively small amount of data in the case, the efficiency of distributed storage is relatively low, and parallel distributed system equipment is more, its operating performance is more stronger. Therefore, the larger the amount of distributed storage, the greater the advantage of distributed storage, and can make the data storage process more efficient by the rational application of computer idle resources [4].

4. A Brief Analysis of Spatial Data Storage Model of Cloud Computing

4.1. cloud storage structure model

Compared to traditional spatial data storage devices, cloud storage needs to be composed of a variety of different devices, and contains hard disk storage devices, network equipment, application software, servers and client programs and many other components. Cloud storage system can be said that the working principle is taken the hard disk storage device as the core, and then external data through the relevant application software to achieve the effect of storage and access. In the current cloud computing storage system, it can be divided into storage layer, management, application interface layer and data access layer of these four modules.

Storage layer: In the cloud storage system, the storage layer is the most basic part of the core, it
can be connected through the network to the various distributed storage devices to achieve the expansion of storage capacity. A storage device can be either a light channel storage device or a NAS cloud storage system's IP hardware storage device. In order to play the function of the storage layer itself, it is necessary to set up a storage device management system on top of its storage device layer and use it to complete the management and maintenance of the system. Through the storage layer, it can effectively carry out logical virtualization management and multi-link redundancy management, and can carry out a variety of hardware equipment running real-time monitoring and automatic maintenance work [5].

② management layer: management layer as a cloud storage system in the control decision-making part of the cloud storage system it also plays a very important role in the operation process. Management can take advantage of a number of technologies such as cluster systems, grid computing, and distributed file management to effectively control cloud storage systems and enable collaboration and operation between different storage devices. So that the effect of management will have a direct impact on the stability of the entire cloud storage system. ③ application interface layer: the management department of cloud storage system can make the application of the development of targeted services interface, according to the user's business different needs. Through the application of the interface layer, which can achieve the live platform interface and video on demand application services, but also to achieve the function of the cloud disk, so as to provide users with remote data backup services.

④ data access layer: through the data access layer it can provide users with the cloud computing public application login account, password and interface, allowing users to directly enjoy the cloud storage system by a variety of data services. In addition, the cloud storage system operators can also provide different types of access and access to the provision of means to fully meet the needs of users based on the actual needs of users.

4.2. Design of Spatial Data Storage Model for Cloud Computing

The spatial data storage model of the cloud computing is mainly based on the BP neural network. The concrete architecture of the system are shown in Fig. 1, and mainly by the neural server cluster, the data control management center as well as the data collection center of these three parts. The neural network learning rule designed in this paper is mainly applied in the data management control center module. Based on the BP neural network cloud computing spatial data storage model of the specific implementation process is as follows: Step1: The model through the sensor to carry out the surrounding environment data collection, which is the main source of cloud computing data. However, in the specific data collection process, the collected data can be provided with certain attributes, and need time, application areas, real-time requirements, the region and the data type these five fields to form the attributes of the collected data, and these five fields can be directly used as a neural network learning method of input. Step2: The training sample construction and the generation of the curve need to learn, after a period of data generation and training process, it can adjust the relevant parameters of the way to be responsible for the load balancing strategy, by means of the neural network model. After the training is completed, you can directly put the model into normal use. Step3: Data Learning and Processing Center: It is necessary to classify these data according to the different attributes of data. The five attribute fields mentioned above can be directly outputted through the neural network model and the corresponding learning process the ID of the server cluster. Step4: Data storage: through the data processing center given the results of the analysis of the model, it can store the various data directly into a pre-developed data cluster. In this process it can also finish the completing the middle of the network operators to coordinate the work and the deployment of a variety of network resources in the cloud computing data storage center to complete the middle of the network operators to coordinate the work and the deployment of a variety of network resources [6].
5. Simulation analysis in order to test the effect of cloud computing

Spatial data storage system based on BP neural network, this paper applies the OPENT Modeler system to complete the corresponding simulation experiment. Through the OPENT Modeler it can provide a complete communication protocol, memory model and connection line for this simulation experiment. In this OPENT Modeler simulation experiment, respectively, set up two server nodes, and in each server node above the five storage unit connection. The two server nodes can communicate with each other through the wired network, and the 10 wireless communication sensors can read and write the various storage units by means of the function of the user server. The read operation mainly refers to the regular acquisition of the information from the storage unit, and the write operation is to send all kinds of information collected by the Internet of Things sensor into the memory and carry on the proper preservation, in the transmission of these signals and during the reception process, the frequency is set to 10M / ms. On the basis of setting the BP neural network rule, the target memory is selected reasonably and the simulation time is set to 20MIN. Through the statistical comparison of the simulation results, it can also be based on the BP neural network spatial data storage system application effect has a clearer understanding.

In this study, the neural model of the error wiring is set to 10-2, when the network reaches a steady state, the test selected 10 storage units of its stored data capacity shown in Figure 2. Analysis for the Figure 2 and found that the information stored in the unit is basically equal, and maintained at around 11700M, which also shows that the storage model set up in this paper has a good fairness and consistency, and can be carried out in the large data processing process to avoid the situation that a storage unit or the server caused by excessive pressure is occurred.

![Figure 1: The basic architecture of the cloud computing spatial data storage model](image-url)
6. Concluding remarks:
This paper mainly analyzes the spatial data processing function and data storage characteristics of cloud computing, and then constructs a stand-alone and distributed platform. On this basis, a cloud computing spatial data storage system model is designed based on BP neural network. In this storage system model, it can build a BP neural network model and learn the training algorithm model, so that the stored data according to their own attributes can distinguish between the server cluster for the selection, which plays a good load balancing function. The simulation results show that the spatial data storage model based on cloud computing has a certain feasibility.

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