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Research on Key Technologies of network GIS cluster based on server virtualization

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Absrtact: The integration of geographic information system (GIS) and Internet has greatly expanded the scope of application of GIS, but also made the application of geospatial information wider, so that different regions and different industries can easily and quickly share information, so that geographic information can be more integrated into public life. With the rapid development of GIS network, the information transportation has been constantly updated. The use of virtual server can improve the accuracy and speed of GIS information transmission. This paper analyzes the key technology and development direction.

Key words: network GIS, network cluster, server virtualization, key technology.

1. Preface
Along with the continuous advancement of information technology, has affected all aspects of our lives, which has been greatly affected by GIS, GIS is a combination of computer and geographic technology, it can provide strong help for geographical science, environmental science and other aspects. The development of the Internet has also led many experts to study and fully integrate the technology of GIS and the Internet, so that many of us can quickly obtain geographic related content through the Internet. Network GIS has changed the traditional clustering method of portal websites, using more information stored on the Internet, computing faster. Of course, this also requires a higher performance of the network GIS cluster. It is necessary to make the service effect of the GIS application better, better mobilize software and hardware resources, and fully enhance the service perception effect.

2. Overview of virtualization network GIS cluster structure

2.1. General network GIS cluster architecture
The general network GIS cluster organization is shown in Figure 1. From the hardware point of view, the network GIS cluster is mainly divided into several aspects: front-end cluster entrance, internal network, back-end GIS server group and storage server group. Cluster entrance usually sets the address of the virtual host, so it hides the internal structure of the server. All the information requests of external users are through this entrance. In the hardware setting of this entrance, the main and backup structure is usually adopted. Two servers, one master and one standby, are connected by the data line. It ensures the safety and reliability of the entry. In the setting of cluster network environment, optical fiber + Ethernet devices are usually combined. The GIS server mainly deals with the internal tasks of the GIS,

which is processed by a large number of server units. Storage server clusters are mainly servers that store geographically related data, and their composition varies according to requirements.

A cluster of storage servers is a set of storage facilities and servers for storing and managing geospatial data. They are diversified according to different application requirements and technical levels.
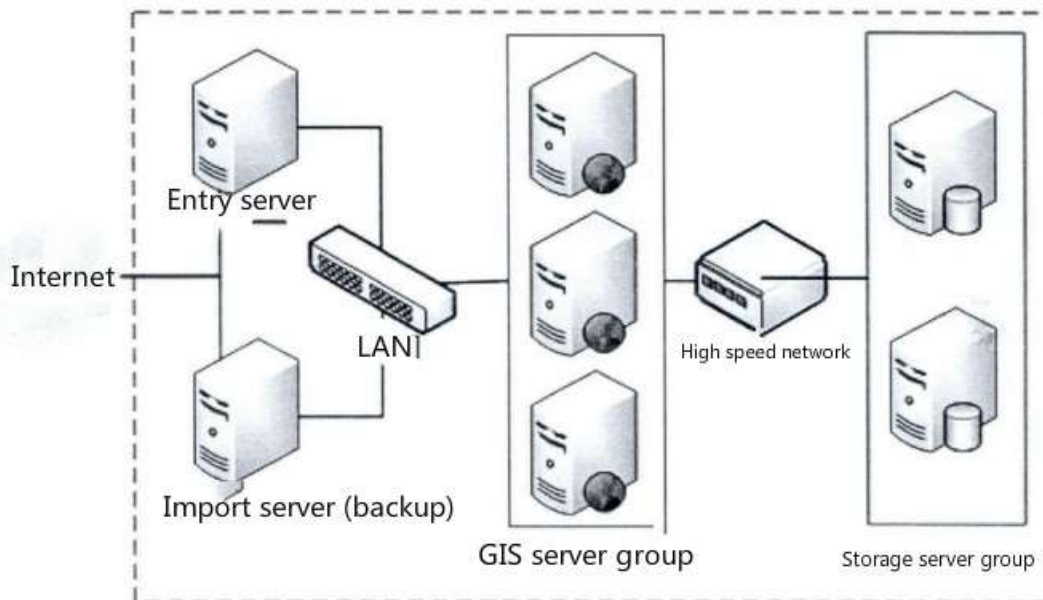

Fig. 1 Basic structure diagram of network GIS cluster

2.2. Design of GIS cluster architecture based on Virtualization
Figure 2 introduces the logical architecture of virtualized network GIS cluster.

(1) the physical layer. It is the bottom layer of a cluster, mainly composed of servers, network devices and storage devices.

(2) the virtual layer. It mainly consists of operating system, virtual machine, software tools and so on. In this level, it is the process of mapping physical hardware to virtual machine and operating system. This is to let physical hardware and the operation of GIS business in the logical correspondence, fully demonstrated transparency. This is essentially different from the one to one relationship of our ordinary hardware. This location is also the key to server virtualization technology.

(3) data level. It is mainly related to data in storage space and related business data content. Because of the virtualization of file storage, what is actually stored is essentially different from what is normally stored on a server.

(4) GIS service layer. This level is the core level of the normal operation of GIS. This level of service handles the important key data in the GIS cluster. For the data layer, it provides spatial data engine for GIS analysis and processing, relational data engine for business logic, and some file data access interfaces; for the core business of GIS, the layer constructs GIS model modeling, and runs GIS algorithm logic component, graphics and image processing logic component, spatial number. According to input and output processing logic components; for GIS services, this level implements a manufacturer-defined GIS service, the important features of which are the correlation between the data input and output format and the manufacturer, the standard and general model of geographic information are not implemented in this level; and the workflow services used to implement spatial analysis process.

(5) Web service layer. This layer is actually an interface that directly interacts with customers. Users can find or obtain the information they need about GIS through Web services layer.

(6) application layer. This is the top layer of the structure, it is based on the specific application of GIS and different clients, according to the interface of Web services layer for data exchange.
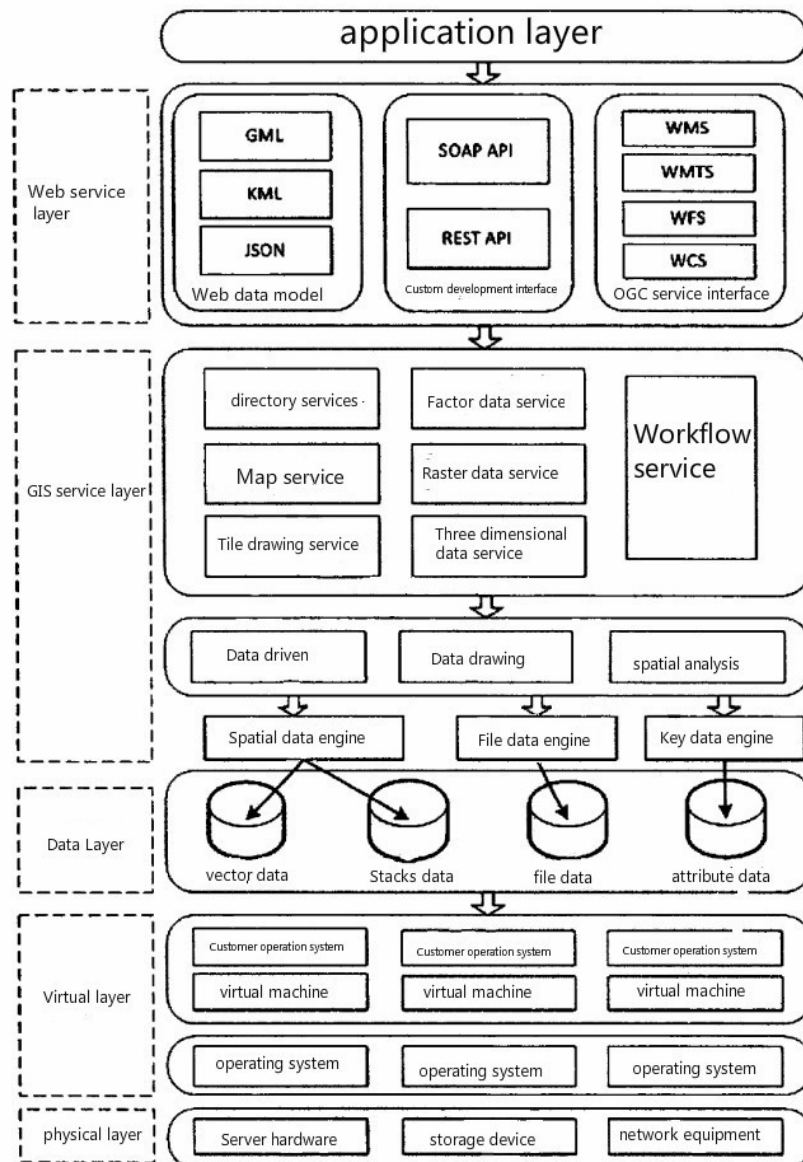
Fig. 2 Web services layer for data exchange

3. Analysis of key technologies of network GIS cluster based on server virtualization

3.1. Server building technology

3.1.1. Platform layer. GIS data distributed storage system can save a large number of data content, can be very efficient deployment processing, the number of processing levels are above the PB level, which is very conducive to our further research activities.

3.1.2. Functional layer. Functional layer is an extended algorithm in the process of data mining. The model uses TB-level data. Cloud computing and distributed coordinated processing are used to balance the load, so that the distributed processing effect is better and the data processing is more effective.

3.1.3. Service layer. By using the relevant methods of GIS data mining of WEB and Open API, starting with the environmental research of GIS data, strengthening the management and control of terminal II and the reasonable configuration of process, the scientific setting and data exchange of terminal II can be realized, and the sharing of GIS data is convenient, fast and efficient. Because the level of service layer is relatively high, we should pay attention to the management of input and output, which can make the exchange of GIS data more fluent.

3.2. Network cluster optimization technology

3.2.1. Neural network optimization. Neural network system is connected by a large number of neurons, can be processed together, distributed information storage, excellent self-learning and other advantages. It is widely used in all aspects of the Internet.

3.2.2. Optimization analysis of grey correlation degree. It is based on the development between the various elements of the possibility of proximity or difference between the degree of analysis and research, it uses a specific concept of information.

3.3. Data processing technology

3.3.1. Data mining. Data mining is often applied in the current era of large data. Its core idea is to use machine learning, artificial intelligence and other methods to find useful and valuable information from a bunch of data sets in order to facilitate some research and application.
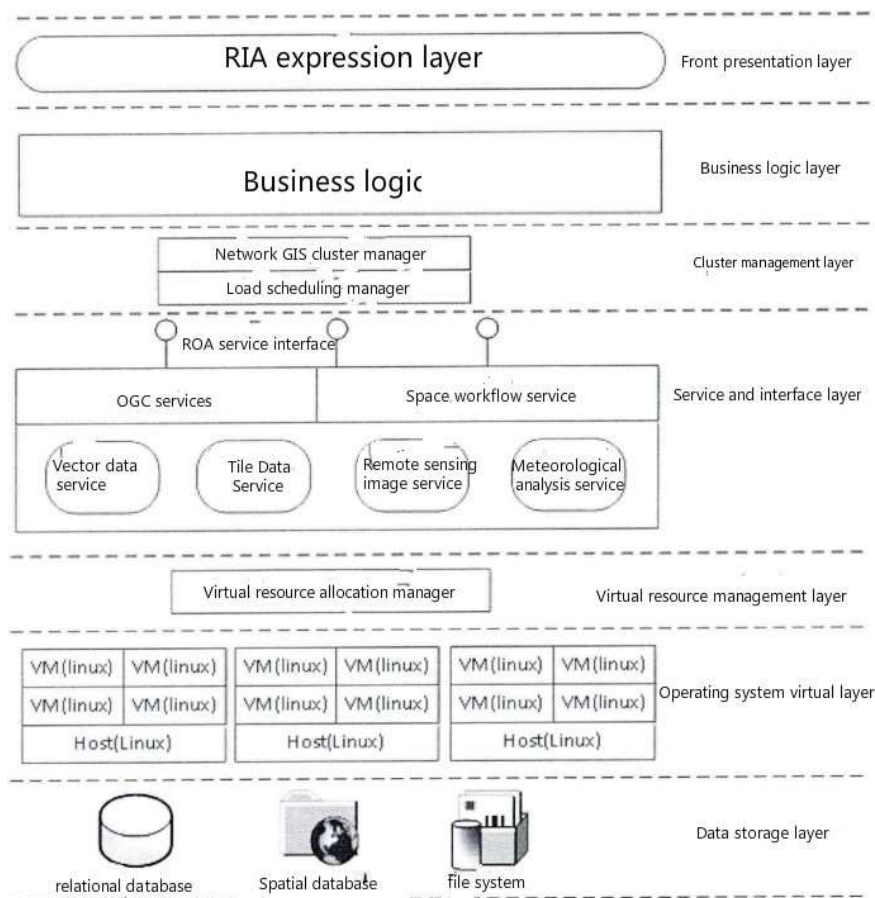

Fig. 3 Prototype architecture of virtualization network GIS cluster

3.3.2. Machine learning. Machine learning is also the most popular technology at present. The key point of machine learning is to let the computer learn by itself, instead of setting up some program artificially. Machine learning can be fully applied to the relevant research of virtual network GIS cluster.

4. Concluding remarks

Server virtualization technology can fully enhance the efficiency of hardware resource utilization, make the system performance fully mobilized, and more applicable, these are all very important means to effectively enhance the stability and performance of network GIS cluster, of course, in the development of virtualization and cluster also exposed some Veneto. For example, the problem of loss, overload and so on, these are the key to further study the optimization of GIS cluster in the later period.

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