Research on Library Data Migration and Teaching Support Services

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Abstract: With the upgrading of the university library server system, it is necessary to complete the data migration of the original distributed server and import the cloud management platform and the virtual storage server. In the process of migration, many problems have arisen. In the construction of library resource virtualization, the problems in database migration have been solved through the implementation of data migration of Heilongjiang Bayi Agricultural University Library. It provides reference and basis for the digital resource virtualization construction of other institutions. On this basis, the development and utilization of teaching resource database is carried out, and countermeasures and suggestions are provided for providing teaching support services for college teaching.

1. Introduction

"Internet + education" brings convenience to us, but it also brings new challenges to the database resource service of university libraries. After upgrading the servers of University Libraries in our country, there are problems of data migration and refinement of teaching support services, facing two new challenges. Through the data migration work and personalized database resource service of Heilongjiang Bayi Agricultural University Library, the following research was carried out, and the corresponding practical experience was obtained, which provided reference for other related library data migration work and library teaching support services.

2. Virtualization

2.1 Cluster technology

Server cluster, as its name implies, is based on multiple servers, integrated into an independent, high-performance server. Share storage space and multiple processors. Provide high-reliability services continuously in the data migration algorithm (implementing the maximum available performance of storage and the speed of storage response), cache sharing, load balancing (improving processor usage), and fault tolerance (improving security and stability). Among them, the blade server is typical.

Blade server refers to the installation of multiple card-type server units in the standard height rack chassis to achieve high availability and high density of high-performance servers.Each card server unit is called a blade. Each blade includes a processor, memory, network controller, and runs a separate operating system. In fact, each blade is a separate host system [1].

2.2 Virtual Machine and Cloud Management

Virtual machine is based on cluster technology and virtualization technology, which virtualizes several machines in physics into a large service platform, namely Cloud Management, on which virtualization platform can be built without binding operating system, and several system platforms can be mounted and supported for centralized service management. You can run different operating

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systems at the same time, including Windows, Linux, and Unix. The goal is to achieve maximum resource utilization and simplify management.

The application systems built on University cloud management platform generally include library management system, educational administration system, financial system, file system, office system, website system, scientific research platform and so on. The distribution is shown in Figure 1.

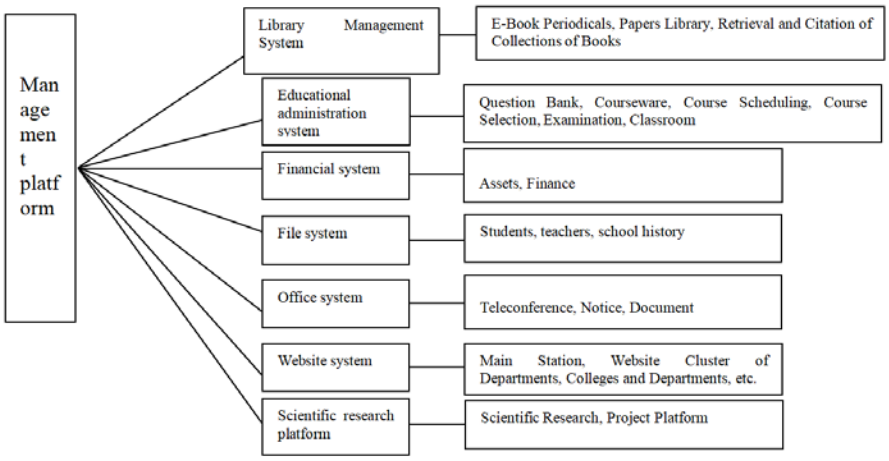

Fig.1 Application system distribute on Cloud Management

3. Data migration

The so-called data migration is to transfer the original decentralized application systems or platforms installed on independent servers to virtual machines so that they can run normally on cloud management platforms, facilitate overall management and operation, and share virtual resources. Requires the overall migration of the operating system on the original server (you can also create the required and compatible operating system on the cloud platform), the most important is the overall migration of the original application platform data.

3.1 Data acquisition, collation and induction

Before migration, it is necessary to make a thorough and comprehensive inventory and collation of each server, to master its underlying operating system, resource allocation, application system size, configuration and usage. The main information is: server business name, ip configuration, space size, operating system (including user name and password) database, file directory location, open service (port), web browsing address, background management (publish address or program), outside with equipment, manufacturers (contacts) and so on.

Summarize the data of the system to be migrated according to the following data classification.

(1) Classification according to data situation: simple data, massive data, real-time data and multi-party related data.

(2) Classification according to business relevance: code data released by websites, data stored in databases, etc.

(3) Classification by application system: classification by operating system, such as unix, linux, windows and other operating system data; Classification by database, such as orical, SQL server and other database data.

3.2 Methods and Strategies of data migration

For different systems and the size of data, the migration methods are also very different. Operating system and application platform are moved to virtual machine separately. If the original overall system resources occupy a small amount and the application system is not complex, it can be migrated together. Several major migration methods are discussed below.

3.3 Simple snapshot migration

System and data migration, first of all, is to complete the system migration, that is, the operating system plus a set of software platforms, make system snapshot files, transmit them to the corresponding system platform on the virtual server, and then import the data part. Some platforms have a small amount of data and can be snapshotted with the system. For example, some small websites have relatively simple migration work and can be transmitted by peer-to-peer network, as shown in Figure 2.

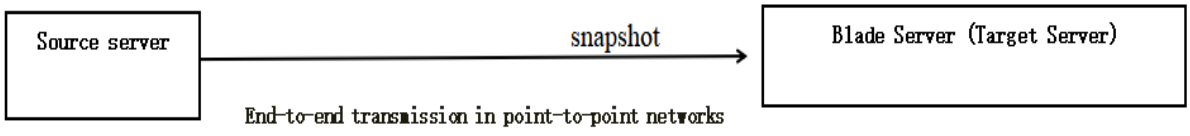

Fig.2 simple snapshots migration

3.4 Using Physical Hard Disk Transmission

Colleges and universities usually have a lot of big data storage business, such as a variety of Library systems, superstars, students, Wipe and other platforms. There are archives, papers and other data-intensive business platforms, usually several to dozens of T, data transmission through the network will have the following problems:

(1) Long transmission time and easy breakpoints.

(2) a large number of scattered files, packaging and transmission is also time-consuming and labor-consuming, difficult to handle.

(3) Rely on high and stable operation of network and equipment. The operation of the network and hardware equipment must be stable, without power failure or network disconnection.

To solve this kind of large storage capacity service migration problem, the conventional point-to-point network transmission method cannot be used, but the method of transferring data through a physical hard disk is adopted, as shown in Figure 3.

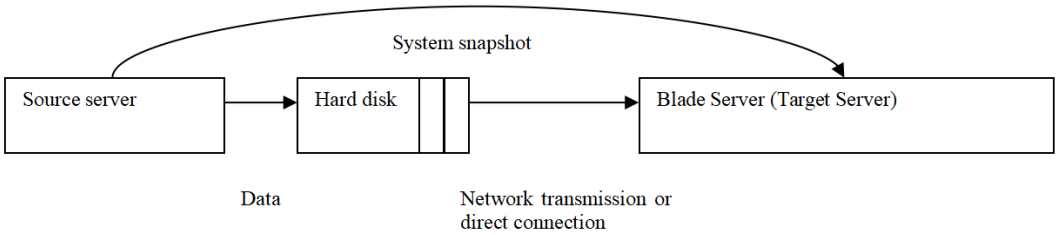

Fig. 3 groups for medium to hard disk or hard disk data migration

There are several ways for hard disk to migrate data:

(1) Relatively few transfers and few hard disks. Solution strategy: Hang the hard disk with copy data on a PC, it is better to share the network segment with the virtual server to speed up the transmission speed and make remote connection for data transmission. It can choose to share the hard disk when directly remotely desktop, or use FTP software for transmission. To ensure that the transmitter, that is, the device machine of the data source, can not set up dormancy, it must run continuously until the data copy is completed.

(2) The amount of data is a little too large to spend a lot of time waiting for business processing. Solution strategy: Connect the hard disk with copy data directly to the virtual server for data migration. This operation requires that the virtual service hardware has an external device interface, and the hardware cost is high.

(3) There is a huge amount of data, which is generally stored in arrays. Solution strategy: Such data migration, the effective way is to load these existing storage hard disks directly into the new storage system, and exchange data with the blade server through FC switch. This situation requires

storage vendors to install, configure and debug.

3.5 For real-time services, data migration of dirty data is easy to occur.

For example, in the book business in colleges and universities, books in the library have new books to be put in and books to be lent out every day, and the data are changing every day, even at the same time.During the migration process, there will be different changes in the data of the same book. This data is either invalid, redundant, or incorrect. We call it dirty data.

When dirty data occurs, it is necessary to relocate the database and do the migration work again. Solution strategy: To prevent dirty data from appearing, we must suspend business when migrating system and data, especially when closing database service. Generally, the migration work is carried out at night or on holidays without affecting the normal business, so as not to affect the use of normal business.

3.6 Data migration for multi-server Business Association

During the data consolidation phase in the early stage of the process, we found that some servers are related to data business, such as a Book database, and many servers have established data interaction with it, as shown in Figure 4:

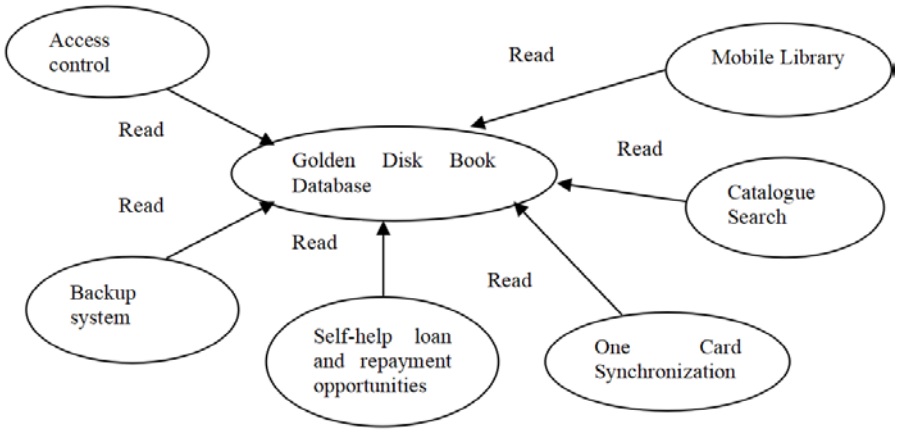

Fig. 4 Multi-server business association

Although the interaction mode is single reading, it also increases the difficulty of migration. First of all, the book database service cannot be interrupted, or other businesses must be stopped accordingly. Secondly, the virtual ip provided on the virtual machine should be accessible by other systems.

Solution: For such servers with multiple associated services, it is necessary to carefully migrate, it is best to build a new system on the virtual machine without interrupting the business, redo the data, and after the data is stable, change the configuration of other servers, adjust the direction Go to the virtual machine of the new system.

3.7 Other questions

Network configuration is complex, routing, firewall and other settings need to be redesigned and reconfigured.

Solution: Plan and allocate the blade server network segment in advance, including the internal network address of the virtual service and the planning of the external corresponding URL, set the management address pool, clear the network connection mode, and clear the line.

Hardware Encryption Processing

Many systems have hardware encryption dogs. Although the virtual machine can be equipped with encryption ports, the interface mode of encryption dogs is different, which increases the burden on hardware and makes management inconvenient. Solution strategy: We asked the system manufacturer to convert the hardware encryption into software encryption.

4. Development and Utilization of Teaching Resource Base

Combining traditional teaching resources with national high-quality courses and MOOCs and other network resources, it has become a new teaching digital resources. There are three main ways to develop teaching resource bank:

(1) Digitize the existing paper resources. For example, the construction of Heilongjiang Bayi Agricultural Reclamation University's "Heilongjiang Reclamation Area History and Records Database" is based on the paper version of the history and records of various farms in Heilongjiang Reclamation Area.

(2) The academic research results of our teachers and students. For example, "Heilongjiang Bayi Nongken University Master Thesis Database";

(3) Resources developed by professional team building. The third way is the main source of digital resources. It completes the development of digital resources through a series of steps such as professional personnel collecting materials, integration of materials, indexing of resource contents, quality inspection, archiving of digital files, and storage in a resource library [2]. The traditional teaching mode is based on the teacher's explanation and mass output of knowledge content, and the student learning process includes two stages: knowledge receiving and knowledge internalization. In the "Internet +" teaching, flipping the classroom is a reconstruction of the traditional teaching process, through the "Internet." +"Digital resource development and utilization, students carry out personalized self-learning before class to realize the process of receiving knowledge; in the class, teachers guide students to discuss, explore and reflect, so that students can learn independently and cooperate with learning. The process of realizing knowledge internalization.

"Internet + education" has changed the channels and ways of human knowledge acquisition, changing the way of knowledge transfer from traditional one-way transmission to multi-directional interaction. Teachers and students form a learning community. Teachers adhere to student-centered, guide and organize students, explore the teaching process of teacher-student interaction, classmate cooperation, encourage students to learn independently and cooperatively, and ultimately achieve teaching objectives [3]. In interactive teaching, students'critical spirit, innovative spirit and team spirit are emphasized, and students' emotions, attitudes and values are fostered. Therefore, the “Internet +” library personalized service optimizes teaching and realizes the sharing of high-quality teaching resources and curriculum resources. For example, in the public lectures on the theory and practice of socialism with Chinese characteristics, teachers broadcast live video of the US presidential campaign speech to students, so that students fully realize the institutional characteristics of the capitalist countries and the essence of the presidential campaign. Embedding digital multimedia resources into the classroom has increased the interest of college students in listening to classes. Instantly discuss problems through online interaction, enhance collaboration between multiple parties to complete tasks, and make students' learning change from passive to active and improve teaching quality [4].

5. Diversified Teaching Support Services

Driven by "Internet +", the database personalization service of University Library promotes and docking various database resources, such as CNKI database, fancy star database and Bo Kan database. Attention should be paid to the high-quality teaching resources announced by the Ministry of Education and MOOCs platforms at home and abroad, actively collecting network courses conducive to university teaching, and providing accurate teaching information and data resources services for university teachers quickly and accurately. To carry out literature retrieval "I classroom" teaching activities, the National People's Congress copy resources database promotion activities and the promotion activities of the audio database. Big Data Analysis Based on Library and Information to Make Service More Accurate and Refined; Through network information technology, accurate content is pushed to teachers and students in colleges and universities to realize accurate docking service.

5.1 Network Services

Under the environment of "Internet +", the demand structure of Agricultural University Teachers' information resources has changed, which makes library services transform from single service to multiple services, and from extensive services to personalized precise services. Tsinghua University's "classroom online", MOOCs and micro-courses at home and abroad provide rich teaching resources for college teaching. University library personalized service librarians recommend the best online course resources to agricultural college teachers, saving teachers to find the latest Education and teaching resources time, effectively assisting college teachers in teaching activities.

5.2 Systematic Services

"Internet +" realizes the sharing of advantageous disciplines resources. Resource sharing is the most obvious advantage in the era of "Internet +". Resources sharing of high-quality courses, e-books and characteristic databases, etc. Using cloud service and big data technology, the existing educational and teaching management processes and methods are reconstructed to make the service more professional. Documents are processed in depth and information is reordered to make information more systematic and standardized, which meets the needs of different teachers. For scientific research teachers, the individualized service librarians of agricultural university libraries value the core journals such as SCI and EI with high intelligence value, and classify and reorganize the journal information to meet the intelligence needs of college teachers. Realize the open interconnection of the various systems of the library, and make the personalized service of the database of the university library more closely connected to the teaching [5] .

(1) The construction of Information Commons (IC) is a specially designed one-stop service facility and collaborative learning environment to ensure open access [6]. Construct computer hardware and software facilities and rich database resources, and cultivate the information literacy of teachers and students in the team of skilled librarians, computer experts and instructors, and promote the exchange of teachers and students. This new type of learning sharing space is more common in university libraries in developed Western countries.

(2) Establish inter-library co-construction and sharing services, personalized retrieval services, personalized information customization services, personalized information push services and reference services. According to specific modes and methods, digital information such as electronic periodicals and special bibliographies is formed through classification, indexing, organization and dynamic linking. Through the network sharing platform, the functions of library sharing, development, transmission and mutual lending between libraries are realized, which provide services for the teaching and research work of college teachers.

Library personalized service needs to establish and maintain a long-term and stable information service mechanism with professional subject leaders, and establish an authoritative professional information resources system to support the selection, description and retrieval of professional information resources in accordance with teachers'professional needs. Through the library's special resources, we can attract more teachers and students and expand the scope of service. For example, the "Precision Agriculture Database" of Heilongjiang Bayi Agricultural Reclamation University and the "Master of Science Database" of Heilongjiang Bayi Agricultural Reclamation University etc.

5.3 Intelligent Service

Intelligent service requires librarians to take more initiative in personalized service. Active personalized service is one-way information service with strong pertinence, which further improves service quality and efficiency. The following is the flow chart of library personalized service:

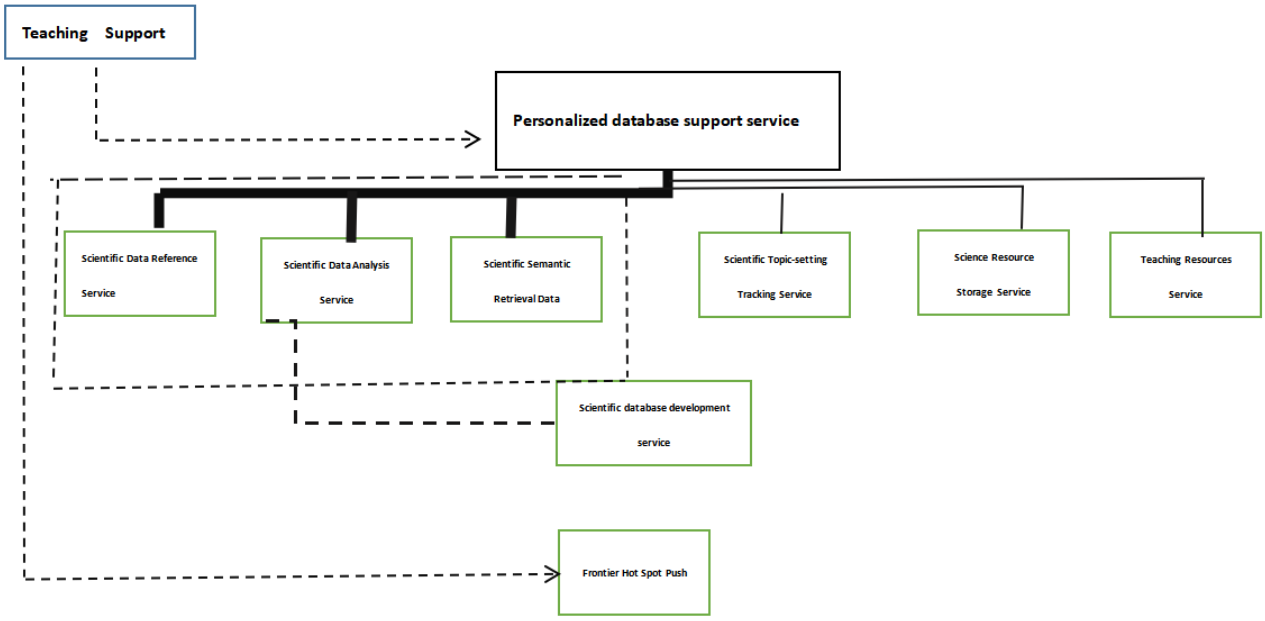

Fig.5 Teaching support service

6. Conclusion

6.1 The verified feasibility of the design scheme of data migration theory

Through the implementation process of the virtual construction project of Heilongjiang Bayi Agricultural Reclamation University Digital Center, the scientificity of data migration method and problemsolving strategy is verified. Successfully loaded the educational system (examination system, course scheduling system, course selection system), website cluster system, superstar books, VIP journals, VIP learning and test questions, scholarship system, HowNet data, Shuobo thesis library, office Business platforms and systems such as systems. The total amount of data is currently close to 200 T, and the operation is stable.

(1) In practice, the main problems that appear in data migration are the migration of massive data and the long time spent, such as the Wipe Journal System, which has a three-year periodical data volume of about 60 T. The solution is to process data separately, copy data by hard disk and transmit data by network in the same network segment. However, there are still breakpoints in network transmission. Using FastCopy software, it can avoid retransmitting completely. The transfer continues at the breakpoint, but once a breakpoint occurs, the transfer task stops, which can be wasted if there is no guard at night. Under the Gigabit network transmission condition, 60 T data transmission also takes about 3 weeks of transmission time. However, such operations also avoid the appearance of dirty data, which is safe and reliable.

(2) Treatment of old systems. Upgrade the system on the virtual machine and rebuild the platform. The method has the advantages that time is bought for data transmission, and normal use of users is not affected.

6.2 Suggestions on Teaching Support Services

(1) Cultivating the Personalized Service Librarian of the Professional Library Database

Attention should be paid to the service consciousness of individualized database and the concept of individualized service centered on Teaching in Agricultural University libraries. We should train librarians of specialized agricultural university libraries to serve individually in databases, build practical platforms for innovation and entrepreneurship education, and strengthen innovative practice. Through the acquisition of the latest development issues and conditions of international agriculture, the introduction of professional training program courses, and increase training.

(2) Organize library personalized service librarians to participate in library and information meetings on a regular basis to learn the advanced international library resource service concepts.

Learn the ability and technology of in-depth mining of documents and data required by users. Enhance the communication between the individualized service librarians of university library databases and college teachers, create a unique collection of information for college teachers and provide sufficient teaching resources to make college teachers better through e-mail, telephone, WeChat, video conferencing, etc. Use the database to obtain knowledge services.

(3) Strengthen Teachers'Satisfaction Evaluation of Personalized Database Services in University Libraries

Satisfaction evaluation is an important means for libraries to integrate into teaching, cooperate closely with university teachers, and improve service trust and influence. Through the assistance of professional librarians, the satisfaction survey of curriculum teachers can help them acquire information literacy skills and reduce the workload of information retrieval and analysis. Can successfully complete the teaching objectives of the subject curriculum and whether it can establish a good cooperative relationship with the librarians [7].

Under the "Internet +" environment, university administrators should attach importance to the database teaching support service of university libraries, increase the training of database personalized service librarians, and input funds for database construction. Make the university library database fully serve the teaching and research of colleges and universities, let the university teachers walk in the forefront of the development of the discipline, quickly update their knowledge reserves, make good use of the library's rich database resources, and make the personalized database service of the university library fully play. Function, high efficiency can serve the teaching work in colleges and universities.

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