Research on Key Technologies of Heterogeneous Data Integration for Digital Campus

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Abstract: With the continuous improvement of information technology, the current information system has been applied in various fields. The same is true for colleges and universities. Through the construction of digital campus, multiple business systems can be integrated to provide students with better services. Especially when colleges and universities are welcoming newcomers, the integrated campus service construction can make students integrate into campus life more quickly, reduce the workload of teachers, and actively help the optimization of teaching. Based on this, this paper starts with the definition and advantages of digital campus, firstly explores the characteristics and methods of heterogeneous data integration, and then focuses on the key technologies of heterogeneous data integration for digital campus, hoping to give digital campus construction and differentiation Relevant research on the integration of the structure provides some reference.

1. Definition and advantages of digital campus

Digital campus is a relatively broad concept. It is based on computer and multimedia technology, and introduces the current informationization means. It can integrate the various measures of teaching, broaden the depth of education on campus, and is conducive to teaching quality and teaching level. Improvement. In the entire digital campus, the network is the foundation, and the network needs to be used to realize data exchange. At the same time, the network is also the key to information storage. Of course, with the network foundation, the corresponding information service is also needed. It is based on the hierarchical management of the digital campus to provide information services and can provide services for various decisions of the leadership. In addition, the digital campus also includes a personalized portal, mainly for identity authentication and user login.

Digital campus has many advantages. It is based on information and can realize the integration of various services such as life, management, scientific research and teaching. It can also collect and organize information resources, which is conducive to improving the management efficiency of the campus. In addition, the digital campus can also establish a virtual teaching space to digitize resources, thus breaking the time and space constraints of traditional teaching and helping to deepen the impact of education. In particular, digital campuses can make various management and teaching activities intelligent and networked, so they can develop personalized education and make education more open. In addition, the digital campus is also characterized by networking. People can access the port from any time and place to learn, and can also retrieve data according to the needs, providing a guarantee for personalized education.

2. Characteristics and methods of heterogeneous data integration

2.1 Characteristics of heterogeneous data integration

Data integration is a unified access through decentralized data, so that data can be transmitted more intelligently, and information can be integrated and processed. In traditional universities, because different functional modules have their own databases, the data is incomplete and

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inconsistent. Data integration can enhance the utilization of data resources. However, in the traditional data integration, there are also their own limitations. First, there are problems with data sharing. Most of them are in the form of low efficiency such as mobile hard disk. Secondly, information cannot be effectively integrated, and there is a lack of unified access management, so that the exchange of data is greatly affected. In addition, there is a lack of unified interface and overall planning. Therefore, in the current digital campus construction of colleges and universities, heterogeneous data integration is introduced, and multiple business systems in universities are integrated into one, mutual operation and compatibility are improved. Blocking the differences in various types of data and achieving overall planning and management will help improve the efficiency of various teaching activities.

In general, the characteristics of heterogeneous data integration are mainly as follows:

(1) Consistent data access. In order to effectively realize information integration, heterogeneous data integration can be integrated globally, and a unified interface can be used to extract information, so that different information resources can be restricted from being restricted by format, access port and location. This feature can be greatly improved. The versatility of campus data makes overall access more convenient.

(2) Data acquisition is more direct. Through heterogeneous data integration, information systems can be effectively integrated to form a unified data source, so that different access requirements can be directly entered into the network for query, which is faster and more efficient.

(3) Data extraction is more complete. Through heterogeneous data integration, information is presented from the system, and the original state of the information is maintained, and problems such as loss due to different attributes are not caused. This measure can effectively ensure the integrity of the data, whether it is extracted or displayed, it is greatly optimized to meet the needs of users.

2.2 The way of heterogeneous data integration

Heterogeneous data integration requires effective integration of information systems. Currently, it is mainly based on the integration of federated databases, data warehouse consolidation and mediation-based integration.

(1) Based on federated database integration. Based on federated database integration, the data source of multiple heterogeneous database systems is formatted, so that the integrity of the data can be effectively ensured, and then the data is shared in the entire database system. This is also an early way of constructing the information system.

(2) Based on database integration. The method based on database integration is to extract the data in the heterogeneous database system, and then eliminate the differences one by one, and establish a sTable database storage collection to provide a more centralized and unified retrieval service. The advantage of this heterogeneous data integration method is that the data service is faster and more convenient, but the integration process is more complicated.

(3) Heterogeneous data integration based on mediation mode. Heterogeneous data integration based on mediation mode is to complete the collection of data through intermediate media such as standard protocols and middleware. This combination is more common at present, but if there is a problem with the media, the overall collection system may collapse.

3. Key technologies for heterogeneous data integration in digital campuses

3.1 Establish digital campus information standards

The establishment of a digital campus requires a unified information standard. This is to ensure the consistency of the data format and facilitate the communication and communication of data. Therefore, the data will be uniformly coded in the campus first, and constructed according to the standards issued by the Ministry of Education. Establishing a unified standard can avoid duplication and redundancy of information, and can also be shared in time to improve the utilization of information resources. This is the basis for ensuring the smooth development of various educational

activities.

In the establishment of information standards, we must first conduct preliminary research, summarize the overall information range, and all kinds of documents and forms should be included in the scope of the code. The information is then carefully analyzed, reclassified in accordance with industry standards, and then unified coding is performed by the school's information department to upload the encoded data in the overall campus network. In the information coding, we need to pay attention to the principle of uniqueness and simplicity, and divide them according to different types to ensure their scientificity.

3.2 Digital Campus Heterogeneous Data Integration Solution

The heterogeneous data integration of digital campus requires simple and rapid unified management of each business system, and then equipped with management modules according to business needs. Therefore, we must first carry out research and development on the program, develop programs according to specific situations, and realize the work of system data packaging. Secondly, according to the configuration of the upstream program, the program is packaged and the data is periodically stored. Because the system needs to follow up at all times, it is necessary to have data to search for new ones, which are mainly classified according to the characteristics of the data. For example, a student's information may include name, student number, date of birth, political appearance, and place of origin. At this time, the name is used as the map key, and then the connection is stored in the database. Of course, the key selection of the map can also be changed according to the requirements. Then, the business database will summarize and summarize according to the received information, and update with the traditional data. If it does not match the traditional data, it will be set as new data.

Data cleaning is also a key technology for the integration of heterogeneous data. It converts data items that do not conform to the business system or missing data into standard data. In the process of data retrieval, new business data can be obtained, and then stored in the business system, and the data is cleaned and read into the temporary Table. At this point, the data cleansing will convert the data into a configurable mode according to the corresponding protocol, so that it meets the national standard for the conversion process. After data search and data cleaning, data loading can be performed, and the corrected data can be entered into the database to realize various types of data access and extraction.

3.3 System Security and Management

A heterogeneous data integration for digital campus also needs to consider system security, including security, data resource security and application system security.

The network bears the various business processes of the network system and needs to be secure and reliable. Campus network establishment internal LAN can be controlled by firewalls and routers, but the campus external network needs to be connected to the Internet. At this time, the host needs to access the Internet. Simply relying on IP address identification protection cannot solve the problem, and it is necessary to take corresponding measures for routing characteristics. Firewall restrictions and isolation. In response to this situation, we must first conduct regular security network testing, use professional testing tools, and check the operating system, network, and device hosts. Once problems are found, we must take timely measures to achieve network security. Secondly, it is necessary to enhance the intrusion prevention and network monitoring, and adopt the combination of ID S and firewall to actively form a protection system and strengthen the monitoring of the entire campus network. In addition, the campus network needs to combine different business systems, which is the basis of its operation. Therefore, a large number of student terminals join the campus network, so it is necessary to pay attention to the security protection detection, pay attention to whether the access port has security problems, and take a partition. The way to protect the overall operating system.

Data security refers to whether the data resources stored in the digital campus network are safe after the integration of heterogeneous data. In order to solve such problems, data encryption can be used first to ensure the security and reliability of the data during transmission and reduce theft. The

possibility of data is generally encrypted by means of RSA and DES. Secondly, the stored data can be backed up, and the real-time backup can be performed by the dual-system hot backup software, which can effectively enhance the security of the data, and of course, the cold backup of the tape can be used to further improve the security of the data and reduce the data loss. Possible. Data can also be recovered quickly when an unexpected situation occurs. In addition, the enhanced data security can also be achieved through the authority authentication, setting the database access rights to different administrators, effectively avoiding abnormal destination access according to the identification of the identity, and ensuring the security of the network data. The security of digital campus network data needs to be realized through the whole system structure. The layered structure can be used to supervise the daily management activities. For the daily maintenance of firewalls and other equipment, the corresponding security strategy planning is adopted, and corresponding security management rules and regulations are established. Ensure that the campus network data is in a secure environment.

Application systems are the key to implementing a digital campus, so it's also important to ensure its security. In the daily operation, we must pay attention to the management of functional operation authority, record the various operations in detail, and manage the group according to the administrator's identity, which can effectively improve the security of the application system. Of course, you can also set the corresponding data access rights management, you can match the management database and the authentication system, so that the operating system meets the needs of the users, which not only enhances the personalization of the entire application system, but also benefits the system. safety. In the current digital campus construction, even online user monitoring is enabled to identify dangerous system operations, which can effectively identify user operations that threaten system security, thereby improving system security.

4. Conclusion

In order to better provide services for students, most colleges and universities have taken measures of digital campus construction, and at the same time integrated various functions to achieve the comprehensive utilization of heterogeneous data, which has positive significance for the improvement of school service capabilities. Especially for the orientation work of the school, a large number of new data sources need to be entered into the campus management system. Through the integration of heterogeneous data, the workload of the faculty and staff can be effectively reduced, and the entrance experience of the students can be improved. Based on this, this paper analyzes the definition and advantages of the current digital campus, and combines the heterogeneous data integration to explore its characteristics and methods. Finally, from the current situation, analyze the key technologies for the heterogeneous data integration of digital campus, and establish a digital campus. Information standards, digital campus heterogeneous data integration program. The three aspects of system security and management explore the core technology of establishing heterogeneous data integration in digital campus. It is hoped that this will provide a reference for the digital campus construction and heterogeneous data integration in colleges and universities.

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