

Research on Application of Internal Data Integration Platform in Colleges and Universities

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Abstract

In this paper, internal data integration models and mechanisms in colleges and universities were explored from the theoretical research of education information data integration in colleges and universities, including data exchange standards of unified schools, system access interface specifications, etc., a set of practical and efficient, fully functional data integration service platform was designed.

Keywords

Data Integration; Heterogeneous System; Data Exchange Standard.

1. Introduction

After a long period of information construction, many business subsystems have been formed inside the colleges and universities, they are separated from each other in applications and data levels, and they use different architectures and development technologies, respectively. Moreover, the data maintenance and management of each business system lacks unified management, resulting in inconsistencies, differences in data among different sectors, what's more, the data published by the two departments are even in conflict[1]. Furthermore, each business system only contains the core data of the department, lacks integrity. Establishing the unified school data integration can effectively ensure the integrity and consistency of data, reduce data redundancy and improve authority.

2. Design Ideas

2.1 Follow the unified data exchange standard

The object of the data integration platform is to exchange data between the data centers and various business departments and original business systems[2]. Since the technical architecture of each original system is different and the representation of information is different, in order to exchange data among these different systems, the primary issue is to define a standard data format and specification of data exchange, so facilitate seamless connection among different hardware platforms, different operating system platforms, different language platform applications.

2.2 Support data interaction and access to heterogeneous systems and heterogeneous databases

Data integration first involves how to exchange data with departments at all levels, various heterogeneous systems and their heterogeneous databases, and achieve unified access to data[3]. Data extraction rules are defined for the data of departments at all levels and various business systems, and then the required data are automatically extracted from the databases of departments at all levels or the corresponding business systems.

2.3 Support flexible data exchange means

According to the situation of different departments, there are different update requirements for different types of data, and many data exchange means can be flexibly adopted, respectively [4], for

example, real-time updates are realized for data with frequent information changes; for data with less frequent information updates, such as personnel data and equipment data, regular updates are realized. Furthermore, the time data exchange can be defined flexibly. For example, in order to avoid network peaks, data exchange can be carried out when the network bandwidth is idle; for business systems with high pressure on working hours, data exchange can be conducted in the evening or early morning hours, so reduce the pressure on business systems.

2.4 Can conduct validation and quality control for the exchanged data

The platform needs to be able to adapt to changes of the contents and formats of data from each system, provide the visual conversion configuration interface, and realize flexible conversion between data from each system and the central standard data, and can carry out validation and quality control for the exchanged data [5].

3. System Architecture

The core parts of the data integration platform are: application adapter, data exchange engine, data service and security management system. The system architecture is shown in Fig.1.

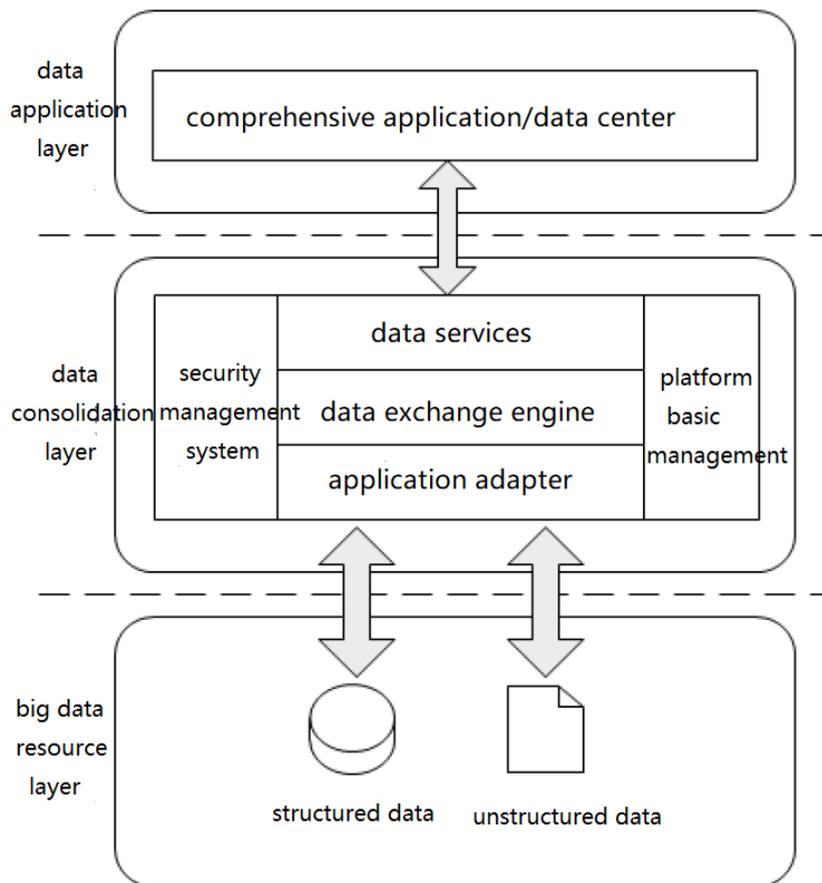


Fig. 1 Structure diagram of data integration system

Application adapter is modular software that can be easily connected to specific application systems; it mainly solves the problems of connection and data exchange between the application system and the data exchange engine, etc., and realizes functions such as data extraction and encryption.

The data exchange engine is the basis for integrating different application systems. The loose coupling connection is formed among different application systems via the data exchange engine, and realizes functions such as information conversion and information subscription/publishing.

The data service module stores various data patterns in the data exchange process and provides data services for the comprehensive application layer or data center.

The security management system is to make security run through the research and design of the data integration platform, and manages the log, anomalous and other functions of the data integration platform, establishes safe and reliable data exchange, ensures safe data transmission, and assists the normal operation of data exchange.

4. Key Technologies

4.1 Application Adapter

The design of the application adapter should generally be based on the client/server (C/S) model, the business side is equivalent to the server side, the client is implemented in the adapter, the access process of data is realized via the interactive operation of the client and the server, the client sends the data access request to the server, the server accepts the request and completes the request processing by calling the corresponding data access interface, and returns the processing result to the client.

4.2 Design of data exchange engine

The data exchange engine is equivalent to an information bus, and various application systems access the data exchange engine via the adapter, and complete data conversion and transmission functions, etc.

As the working foundation of the data exchange engine, the information storage standard of the data integration platform must first be set. The object of establishing the data storage standard of the data integration platform is to establish the mean standard for the data exchange of heterogeneous systems, the data integration platform stores data in the basic coding and data format defined by the standard. When carrying out data exchange, it is necessary to carry out data conversion between the standard data stored on the platform and the data of each application system.

In order to achieve the above data conversion, when each digital campus application system accesses the data exchange platform, first of all, the data mapping configuration is required, namely for each basic coding and application information, carry out the mapping relationship set between the existing basic coding and data format of the application system and the basic coding and data format of the platform standard.

The data processing flow of the data exchange engine is as follows:

- (1) Receive the data that is extracted from the application system information of the information sender to the data integration platform via the application adapter;
- (2) According to the relevant data mapping configuration information for the application system of the information sender, the received data is converted into data based on the data storage standard of the platform;
- (3) Store the converted data in the standard database of the platform;
- (4) Start data push based the data push means that the platform has set;
- (5) Read the data that needs to be pushed from the standard database of the platform, according to the relevant data mapping configuration information for the business information system of information receiver, conduct conversion of data format and basic coding for data based on platform storage standard;
- (6) Send the converted data to the business information system of the information receiver via the data service interface.

4.3 Design of Data Service

The data service is used to manage all the data services that the data integration platform can provide to each business side. Web services can be used in implementation. The data integration platform and

the business side interact via the SOAP protocol. The connection between the adapter and the business side data source requires database connection service, relational database and XML document conversion service, etc., the several components contained in the application adapter and the information provided by the data exchange engine also belong to Web services, they need Web services to coordinate and manage. The management of data service to service includes publishing service, service request, service search, etc. The service publisher publishes the services that a certain component of the data exchange platform can provide to the registry. When the service requesters need a certain service, they search service in the registry via the search engine of the service agent system, and respond to the service requester after finding the service. Web services adopt SOA (Service-oriented architecture) technology, which carries out service packaging via various components of the system, and defines the interfaces and contracts among services. The loose coupling between the various components of the platform system can be realized via the application of SOA architecture, and the reusability and extensibility of the system can be improved.

5. Conclusion

The data integration platform is the core support platform of the digital campus and the bus of the information transmission and information exchange of all business systems in the colleges and universities. The data in each business system is automatically uploaded to the basic database of the data center on demand via the data integration platform, and the shared data is distributed to each business system in accordance with the needs of each business system, thus realizing the unified integration and standardization of data, the original data of each business system is maintained to ensure the independence and integrity of each business system. Furthermore, it lays the data foundation for comprehensive query and statistical analysis of data.

References

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