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Data Integration Platform for Village Emergency

Wang Ying[*1], Wang Daoping[*2], Liu Guangli[*3], Li Di[*4]

[*1, First Autho1, 2] *University of Science and Technology Beijing, Beijing, China, alyce@126.com*
[*3, **Corresponding author, 4**] *China Agricultural University, Beijing, China, liugl@cau.edu.cn*
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Abstract

Emergency management information source is analyzed for rural China. Online processing (OLAP) is a new data analysis technique, which is described in detail for emergency services and can play a supporting role in the decision-making Meanwhile, village emergency services in the data subject has also been designed and made from forest fires as an example in detail. A multi-dimensional data set can be created based on the data source. Different cube should be built for different theme. And data cube comes from data warehouse not database. The ETL tool is developed based on SQL Server 2008 Integration Services API, by which data extraction, cleansing and loading can be completed.

Keywords*: Data Integration, OLAP, emergency, ETL*

1. Introduction

Natural disasters can be infer to natural process occurring in ecological systems, which can lead to imbalance in socio-economic system, and social property losses, and serious social resources supply and demand imbalance [1]. When large-scale natural disaster occurs, countries need to hit the scheduling and allocation of resources. In this paper, forest fires system will be as an example to discuss OLAP method for village services and information and data integration issues. And a data integration platform for village emergency is d built based on Microsoft .net 2008.

Forest fire data concerns the forest fire detection, fire prediction and disaster assessment. Meanwhile, as sub-elements of modern village emergency public services framework, relief supplies, shelter facilities, roads and other data communications are needed to be integrated to the database, for policy-makers and for food supplies and resource scheduling decision. And construction of database and data warehouse will play important role in future emergency public services for deeper data mining and OLAP services and so on.

2. Data source

Forest fire emergency services are to carry out a series of emergency activities to understand and master all the necessary basic society information, after the fire or forecast released. As a subsystem, it is necessary to access to relevant monitoring data by the network interface. Monitoring department provides decision makers after warnings or forecast information, by data query, comparison and analysis.

Database includes the following items. The first is geography map class. Second, public service information types: emergency material, human resources and shelter information. Third, disaster information categories: disaster-related data tables. Fourth, public facilities categories: strategic key places and lifeline engineering, such as sources of secondary disasters. Fifth, the organizational structure categories: firefighting organization registration form, fire fighting equipment, registration tables, fire fighting equipment table.

This information comes from different departments, such as earthquake departments, forestry departments, meteorological departments specialized database, or the government, hospitals, schools and other departments of information. As these data involves many departments and a wide range, and a lot of information no electronic only by manual input, thus it is difficult to collect and collate data. This has caused great difficulty building the database.

Although e-government has developed for a long time in China, but a variety of paper documents still a large proportion. The data is not open, share, and inconsistent of data attributes among the various departments. The same unit in different departments may use different data storage technology, resulting in data storage in different ways also [2]-[3]. Therefore, in basic data extraction, transformation and loading process, it is required to be in accordance with a unified standard multi-source heterogeneous data into a real-time database. Then we can converse these data to data warehouse, for future OLAP and data mining.

3. OLAP for village emergency

An important application of Data warehouse is OLAP, which supports complex analysis operations. OLAP focuses on decision support and provides query results which are intuitive and easy to understand. According to different organization approaches of integrated data, the current common OLAP can be divided into two classes: MOLAP mainly based on multidimensional databases and ROLAP based on relational databases [4].

In village emergency information, there are many data types and complex data and data analysis tasks. Therefore, the cubes need to define a number of different themes to describe the data and decision-making support. According to demand, we have definite different data analysis themes such as store materials, material trade, disaster, material using, and so on.

According to different needs of subjects, the cubes are extracted from data warehouse. Then display decision support data to the user by tools, such as Excel, Crystal Report, OWC and so on.

Forest fire data analysis, for example, the theme is forest fires loss data analysis. The goal is to know the loss of property and people in different fire happened areas. According to level of different levels of fire damage, decide whether to enhance the strength of the larger fire area. From different dimensions, OLAP analysis include: number of fires, fire grade level and number of casualties. Then compare the difference in a given period and increase attention to those areas vulnerable to disaster in order to achieve early warning function. Then seek for the cause and make impact analysis.

4. Heterogeneous data transformation

ETL tools can first build a data warehouse, and on the other hand can also form a cube to support OLAP operations.

Distributed object technologies for heterogeneous data integration include COM, EJB and CORBA and other technologies. CORBA has a good interoperability and openness, but development is poor. Based on Java server component model, cross-platform of EJB framework is very good, but poor interoperability. And Microsoft COM technology is more complete platform, which has a corresponding development tools support, and development is relatively simple, efficient, but poor cross-platform is its shortcomings.

For modern village emergency data integration, we think that COM technology is more appropriate. The reason is that computer in China widely use Windows operating system, and lesser cross-platform. Moreover, Microsoft's system can be seamless [5].

Traditional database system is divided into several logical components by OLE DB. These components can communicate with each other between the relatively independent [6]. Data exchange platform can be designed by the above components based on the OLE DB. Data users do not need to know the specific application data source, but obtain the query data by interacting with the OLE DB interfaces. Thus the design process is simplified, and the heterogeneity of the data can be shielded.

5. Heterogeneous data integration

We use SQL Server 2008 as our system database. By integrated services API, we established map for various heterogeneous data sources. Thus heterogeneous multi-database system has constructed.

SSIS is used to generate the platform of high-performance data integration and workflow solutions, including data warehouse extraction, transformation and loading (ETL) operation. SSIS can provide strong support for built-in business application development tasks, containers, conversion and data

adapter, which are in the package. Our paper also uses the Flat File Connection Manager, used to connect the other not stored in the database data source.

Although SQL Server 2008 components can meet most of the kit provided by the user demand, but its flexibility is not high, so more suitable for the global type of data integration. Each local database in our system needs to define input/output model of data access for each other, so the fixed package can not be used indirectly. We developed packages according to different situations. Therefore, we used SSIS API to self-create packages.

Data integration platform designed to build data integration package for different data sources. The platform can select the corresponding data source and target data table columns correspond. Thus package can be generated with the extraction and conversion functions. Column information is accessed through data dictionary in DBMS system tables. Then, we construct a class to store the target column type, length, precision, code pages and other information. Directly convert data format of source column in order to avoid the phenomenon of incompatible formats.

6. Platform construction

In our platform system running process, the contents of data source table can be selective and correspond to target data table columns, without considering format change by user. For example, select two columns from HS09 as Table_1 the name and the property column. Then package file can be generated by using SSIS API.

By "progress in the implementation package" can conclude that SQL Server Integration Services features are very strong. In the case of small data integration is faster.

7. Conclusion

Platform software can be flat files, ACCESS database and SQL Server2008 database as the data source, SQL Server2008 as the data target to generate the data conversion package. Then basis data warehouse of village emergency has built and OLAP operations have be realized. Data experiment shows the data integration platform is strong.

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9. References

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