Research on a Modeling Method for Multi source Heterogeneous Energy Power Database

Jian Chen[1,*], Dong He[1], Yibin Kang[2], Chunlei Zhou[3], Jimeng Song[3], Anqing Chen[2], Jinhu Li[2] and Ziqi Shen[3]

{[*]Corresponding author: sgsg_sgsg89@21cn.com}
{ luweilong1976@outlook.com, xiaoqimin321@163.com, wanghongxi1234567@163.com, zhouweimingjournal@163.com, zhangguangdegao@163.com, zhangguangdegao@163.com, luoyiwangelectric@163.com}

[1]State Grid Zhejiang Electric Power Co., Ltd, Hangzhou, 310007, China

[2]State Grid Info-Telecom Great Power Science and Technology Co., Ltd, Fuzhou, 350000, China

[3]State Grid Corporation of China Big Data Center, Beijing, 100052, China

Abstract. With the development of modern science and technology; People's demand for resources is increasing; The original resources can no longer meet the needs of modern development; We need to find a new energy source to replace the existing resources; This resource is required to have the advantages of low cost, large reserves, low pollution and strong sustainability, etc. The logical model and physical model structure of data warehouse suitable for company decision support are analyzed and designed, and the technology of data extraction is studied in detail. Based on the practical application research of strategic prediction and tactical prediction of power energy load with multi-source heterogeneous data, a new energy power system that can meet the practical decision application is designed and realized. This paper explains the database modeling, which can reflect the power model by introducing the data stored in the database, and then explains that the database model analyzes the relationship between unstructured data and structured data and forms the unstructured data association model. Finally, the data of quantity and non-sexual structure are counted. Finally, this paper constructs a power database to describe the overall idea of the database in the form of flow chart.

Keywords: Energy and Electricity, Multi-source Heterogeneous Data, Database Modeling, New Energy Power System

1 Introduction

In recent years, solar energy, wind power and other renewable energy sources have developed rapidly, and their proportion in the global energy production structure has gradually increased [1-2]. It is difficult to achieve safe, stable and efficient operation of the power system by relying solely on supply-side dispatching optimization [3-4]. Therefore, the demand-side response technology is mainly proposed[5].

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In the process of power grid planning, the connection of new energy power has little influence on the voltage selection of power grid. Li Y shows that photovoltaic power generation is often affected by the climate environment, which shows the fluctuation and intermittence of power generation, and the change of electricity quantity has certain randomness [6]. Tushar W mainly describes that the frequency deviation of power grid will be caused by surge current, and the voltage will fluctuate greatly, which will affect the steady-state voltage and reactive power characteristics, increase the peak-shaving capacity redundancy of power grid and directly affect the security of power system. There will be some harmonics and DC components in new energy power generation devices. If the harmonics and DC components enter the power system, it will inevitably cause the voltage distortion of the power grid, which will have a bad impact on the power quality. At the same time, it will also lead to errors in the relay protection and automatic devices of the power system, which will seriously hinder the stable operation of the power system [7]. Nwaigwe K N will definitely replace the energy used in the past, and then become the premise and material basis for people's survival and development. This is only a matter of time and the main trend of social development in the future [8].

On this basis, this article proposes a data warehouse based enterprise information management system based on the actual situation of the enterprise. Based on multi-source heterogeneous data, conduct strategic, technical, and practical research on new energy power systems.

2 Methods of Energy and Electricity

2.1 Multi-Source Heterogeneous Data

The main starting point and foothold of this technology is to promote the realization of mass data storage goals, which can continuously cater to the increasing related data of multi-source heterogeneous data and further promote the realization of data classification and storage goals. For multi-source heterogeneous data storage technology, distributed data storage occupies a high proportion in its storage technology, which makes the classified storage technology of energy data finally completed [9-10]. The storage technology is extremely scalable, and the increase of storage capacity and the addition of servers can be realized simultaneously, thus reducing the tedious operation of further promoting the design of storage results; Moreover, its storage performance remains unchanged. Multiple data integrated into the external fuel gas hotspots of State Grid Corporation of China can promote the flexible use of data storage system based on specific business needs and maintain the normal operation of the system. The form of data storage must pay attention to the concurrent reading and writing of data by multiple managers, and ensure that the data provided by the storage server to different managers are unified in an all-round way. Therefore, the cluster storage of virtual machines is guided by the data management center, which promotes the classification and arrangement of the whole data, so that it can be stored in the database storage server in a classified way, thus ensuring the

effective management of energy data. The storage characteristics of unstructured data: large data storage capacity; Diversification of media forms; Information systems have grown rapidly [11-12]. Integrate data products provided by government departments and institutions to support the government's scientific decision-making, improve the accuracy and effectiveness of social governance, promote the innovation and development of new energy technologies, new formats and new models, promote the transformation and upgrading of the energy industry and the new development of the energy industry, and help the government to modernize social governance and improve the efficiency of public services. The storage characteristics of structured data: for structured data, it takes row storage as the conventional storage mode, and records as the main way to promote its reasonable placement in disk pages; However, the storage mode with column storage and a series of storage as the main form is mainly object-oriented, and the stored data table has always existed alone in the form of data columns. As shown in Figure 1. Multi-source heterogeneous data flow chart:

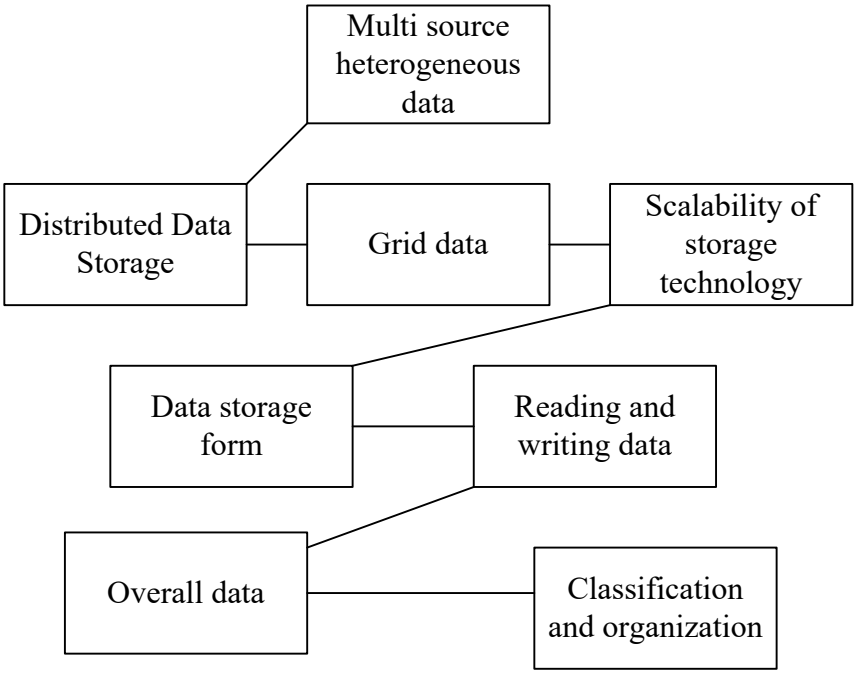

Fig.1 Overall flow chart of power multi-source heterogeneous data

2.2 Database Modeling

There are three main lines in the implementation stage of data warehouse, namely: technical track, data track and application track. The technical track mainly realizes the technical structure design, product selection and installation of data warehouse system. The main task of data trajectory is to carry out dimensional modeling, physical design and data stage design and development according to the results of demand analysis and information collation. The design of data trajectory is an

important part of scheduling decision application, and this paper will focus on this and conduct in-depth research on dimensional modeling of data warehouse. Finally, the application trajectory is designed. The application trajectory should provide user services with various client tools based on the data warehouse platform, including comprehensive query tools, report writing tools and decision analysis tools. Among them, decision analysis should be the main application of data warehouse system, and data mining and OLAP are the most important analysis methods [13-14].

2.3 New Energy System

It is necessary to rapidly improve the business level and service quality of enterprises, and seize the strategic commanding heights in the new round of industrial revolution and energy revolution. Combined with the basic scientific problems in the new energy system, based on years of research and accumulation, the author will focus on describing the performance, power effect and overall emissions of the new energy power system from the aspects of grid-friendly power generation control, thermal power generation flexibility control based on multi-source complementarity, grid dispatching control adapted to high proportion of new energy consumption, side resource characteristics and active adaptive control, and microgrid control based on distributed energy [15].

On the one hand, power generation cost is the most important economic index of thermal power plants, and it is also the core optimization goal of traditional power dispatching, which still needs to be considered in green dispatching. The goal of minimizing power generation cost of thermal power units can generally be expressed as:

$$\min F_1 = \min \sum_{i=1}^{N} a_i p2_i + b_i - c_i \tag{1}$$

Where is the active power of the ith thermal power unit and the total number of thermal power units And; For thermal power units P_i

Is the active power of the i-th thermal power unit, which is the total b_1 number of thermal power units ;

Fuel consumption coefficient:

$$\max = P_i(a_i + b_i) - c_i \tag{2}$$

On the other hand, in green dispatching, it is necessary to consider minimizing pollutant emissions, including the fact that when the pollution accounts for about 80%, the emissions of thermal power plants are generally similar to their pollution emissions, that is: CO_2, SO_2, MO_x Due to CO_2

When the proportion of pollution is as high as 80%, the emission is similar to its

pollution emission amount, CO_2 which is

$$\min F_2 = \min(CO_2 + SO_2) - NO_2 \quad (3)$$

3 Database Modeling

The data stored in the power-based database can reflect the performance indexes such as power model, equipment parameters and system status, and the power database also contains the power grid change records, customer information, and the calculation and analysis results of data processing.

3.1 Introduction to Database Requirements

The main purpose of constructing the database system of power grid enterprises is to realize the optimal management of power equipment and power lines.

Calculate the relevant data, so that the power system can save energy, reduce consumption and maintain stability, so the contents it needs to consider include power equipment, network connection, equipment parameters, assets, customers, and so on. Research on structured key business metadata is carried out. By combing business systems, elements of the relationship between unstructured data and structured data are refined to form unstructured business metadata information (1) Business system combing. Combing the relationship between unstructured data and structured data in the source business system, determining the source business system, related business data source table, related field information, retrieval logic of related business data, subject domain of related data and other information, and following CWM specification and SC-CIM specification, formulating the description specification of related relationship. (2) The unstructured data platform is combed. Combing the unstructured data accessed by the unstructured data platform, determining the unified management scope of unstructured data, and initially forming key metadata elements of unstructured data. Based on SC-CIM and unstructured key business metadata, a structured and unstructured association model is designed and formed.

(3) Design of unstructured and structured correlation model. According to the key elements of unstructured business metadata, combined with unstructured

With reference to the metadata model of CWM data warehouse and following the SG-CIM model specification, the data structure of basic metadata and related metadata is designed to realize the connection and storage of standardized metadata. (4) Design of information storage model such as change and management of unstructured metadata. Design information storage models such as change and management of unstructured metadata to support the operation and maintenance management of unstructured business metadata. Based on the research results of structured and unstructured association models, data management methods such as data classification, data association and quality monitoring are studied, and the unified management of unstructured business metadata and the prototype design of analysis and presentation function are completed.

3.2 Database Model Analysis

This model mainly adopts the design idea of combining top-down and bottom-up, and takes the data received by the unstructured platform of State Grid business system as the demand, sorts out the unstructured data information of State Grid, analyzes the relationship between unstructured data and structured data, and forms an unstructured data association model.

3.3 Data Model Development Results

Based on the existing unstructured data center platform, unstructured data center platform and SG-CIM achievements, combined with the requirements of unstructured business metadata access and unified management based on structured data resources, the UML modeling of power grid enterprise database is carried out by using Enterprise Architect software, as shown in Table 1.

Table 1. Data Model Table

Serial Number	Modeling	Number of physical objects	Number of attributes
one	Unstructured data center platform	119	1180
2	Existing unstructured data center platform	96	941

4 Results And Discussion of Electric Power Database

4.1 Introduction

In recent years, the digital informatization of the power industry has developed rapidly. Due to the complexity of business, in the process of enterprise informatization construction, every department system of the enterprise has accumulated a large amount of data, and every operation and management system has a huge database. However, for these numerous information systems, there is a lack of overall systematicness and planning. Business systems with different components in different periods may be based on different data warehouses and operating system platforms, which makes it impossible to effectively share and interact with data among various systems, and it is easy to form an information island phenomenon. Establishing the application platform of electric power database can not only realize data sharing, but also make overall analysis, collaborative processing and storage mining of the data of each system. It can be seen that the establishment of structured power data warehouse application platform can meet the demand of power application system for sudden query and improve the efficiency of enterprise operation.

4.2 Process

The design and construction of electric power database application platform should fully embody the hierarchical idea of data center design methodology, and mainly adopt hierarchical structural design. For each level design, it must be required to have

strong logic, reasonable function distribution, relative independence between levels and clear interface between levels, which is conducive to future scale expansion. The application platform designed in this way is not only beneficial to the logical design and development of the system, but also beneficial to the convenient and flexible physical distribution implementation. Design Data Collection Layer When designing the data collection layer, not only the data of each business system of the enterprise should be comprehensively extracted and collected, but also the data from some other external data sources, which mainly involve six aspects: production and operation, power marketing, human resources, power logistics, planning statistics and finance. The collected raw data are separated, cleaned and converted, and then the processed data are loaded into the global industry for qualified access to the internal network, and those that do not meet the requirements are intercepted. Firewall is the most widely used network security protection mechanism at present, which can prevent the dangerous factors on the network from spreading to the LAN. Users should actively use firewalls to effectively maintain network security. The operating mechanism of the firewall is shown in Figure 2.

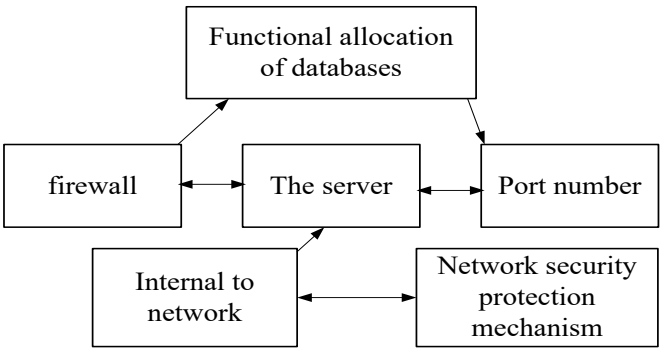

Fig.2 Internal flow chart of power database

4.3 Strategy

The establishment of the application platform of electric power data warehouse can unify the data sources, ensure the integrity, consistency and effectiveness of all data, and realize the sharing and exchange of enterprise data. It can also realize the comprehensive and sudden query of data, make full use of the data in the data warehouse and dig deeply, thus providing convenience for the management of enterprises and improving the efficiency of production and operation of enterprises.

5 Conclusion

In the era of new energy, in order to reduce pollution, most enterprises and governments have to draw lessons from energy and electricity to establish a database, so all countries in the world are actively counting energy data and establishing relevant databases. In addition to the above-mentioned China electric power database, the use of multi-source heterogeneous data overall process, electric power database

modeling and new energy power system formula can make up for the shortcomings of the traditional electric power enterprise system, and can also ensure the real-time and safety of the system and improve the durability of energy. Taking Jiangsu Province as an example, the overall data of predicted power generation from 2018 to 2020 and the data value of CO emission coefficient of main power generation technologies in Jiangsu power industry are calculated. Finally, based on the results of the electric power database and the discussion on the need to build the database, an information exchange platform between various business departments of the electric power enterprise is established, which realizes the sharing of information within the enterprise and the effective management of the financial value of the enterprise funds.

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