Design of a New Generation Power Grid Dispatching Automation System based on Distributed Object Technology

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Abstract: In this paper, the development of our country's power system with the actual situation, put forward our country's power system development of new ideas. According to the development status, actual demand and future development trend of power system, a distributed object architecture is proposed to solve the contradiction between the complexity of power dispatching automation system and the real-time performance of the system. The system has the characteristics of high real-time, strong software and hardware configuration and database management, which lays a solid foundation for further improving the operation control ability of power system.

1 INTRODUCTION

Object Organization is a mature new technology that will bring a second revolution to the client/server architecture. Prior to this, computer systems were basically single machines, but with the development of the Internet, there was a client/server computing service model, with multiple clients, you can share resources like database servers and print servers. With the development of Internet, many software have to work under the condition of network products, hardware platform and network protocol provided by different manufacturers. In this context, the limitations of the client/server model emerge, and middleware emerges. Middleware is a common service between operating system and application software. Its main function is to shield the difference of network hardware platform and the heterogeneity of operating system and network protocol, the application software can run smoothly on different platforms. At the same time, middleware plays an important role in load balance, connection management, debugging and so on, which greatly improves the application performance and meets the important business requirements. At this stage, however, the client requests the service and the server provides the service, and the two are not exactly symmetrical (Wu Lijun., 2019). With the development of OOP technology, distributed OOP technology comes into being. An important concept in distributed object technology is the concept of components. Components can operate across platforms, networks, languages, applications, tools, and hardware. The development of object-oriented technology will not deviate from the development track of other technologies. Before any technology becomes mature, it has to go through the setting of a technology/industry standard, distributed Object-oriented technologies, such as Microsoft's"Object Component Model", are in the process of developing industry standards. With the release of CORBA 1.0 standard, Distributed Object Computing has entered a new era. CORBA is an object-oriented method, which provides an object-oriented model, a reference model (OMG Reference Model) and its corresponding framework for object-oriented management. On this basis, an object-oriented modeling method is proposed. A distributed computing environment based on OOP technology was proposed to realize the functions of resource sharing, code reuse, portability and interoperation based on OOP technology. CORBA uses the ORG mechanism to provide a basic mechanism for the activation of remote objects, regardless of the platform and technology used to implement them. In addition, CORBA also provides a set of object services, such as: Name Service, event service, transaction service, permanent object service and so on. It will provide strong support for the development of distributed applications, and will be extended to the field of scheduling automation. Delphi, C++ Builder, j-Builder and other development tools that support CORBA technology

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emerge constantly, which makes the application of CORBA technology easier, and makes the application of CORBA technology easier.

2 ELECTRIC POWER SYSTEM DISPATCHING AUTOMATION SYSTEM DESIGN

2.1 Architecture of Power Dispatching Automation

(1) openness. The hardware, software and algorithm language used in the dispatching automation system should be suitable for the mainstream environment and standards, can support open interfaces, and accord with industry standards.

(2) Operability. Dispatch automation system in hardware, to strictly purchase with international and domestic standards and quality, quantity requirements of various types of equipment, in software, it should be possible to integrate the data and information in the scheduling field to build a graph model library integration system for operation and management in the actual work (He Zenghai, 2020).

(3) to ensure the safety and reliability of the system. Dispatching automation system is the core supporting system of national economy. It must have some functions such as self-check, defense attack and self-healing to ensure safe and stable operation.

(4) integration. Combined with the trend of integrated construction of regulation and control, the system modeling, data calibration, parameter services, graphics, report forms services and other multi-source information and services are integrated and complementary, effectively promote national/network/provincial integration, provincial/local integration, and district/county integration system construction. On this basis, according to the regulation requirements and technical levels of power system, a new dispatching control system architecture is used. The system consists of four layers: hardware, operating system, system platform and application. In order to ensure the normal operation of the integrated control system, the communication equipment made in China must be used. The operating system layer, is in Windows, Unix and other operating systems based on the secondary development, for the future development to prepare. The system platform is a real-time information platform for basic power system dispatching and management, which provides data, equipment and basic services for various applications. The application layer contains most of the functions needed by the current power system dispatching and monitoring, and it is developed and extended in a friendly way. The system is shown in Figure 1.

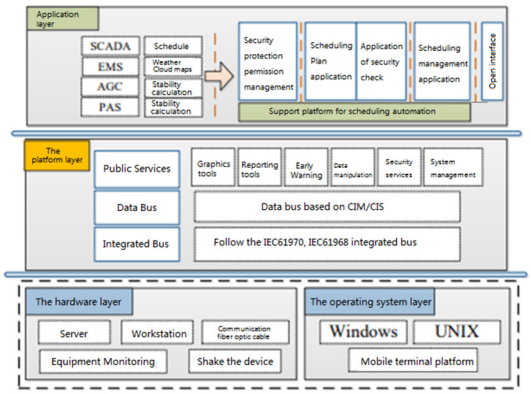

Figure 1: Scheduling automation system.

2.2 Hardware System Architecture for Scheduling Automation

In the future, the working mode of power grid dispatching automation system will be to collect, transmit and process a large amount of information in a complex and highly automated power grid, and to achieve system reliability and business continuity under high demand (Hu Jun, 2020). On this basis, the development trend of power network is prospected. The working mode and communication circuit of the system are designed. As shown in Figure 2.

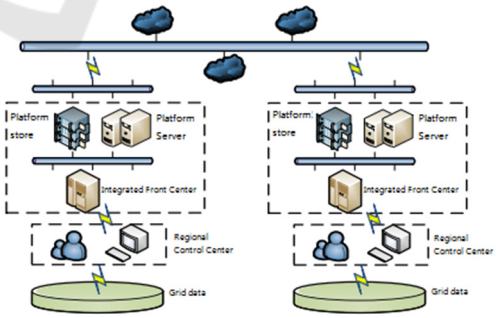

Figure 2: Hardware system architecture for scheduling automation.

Its basic idea is: take the high-speed communication network as the carrier, under the real geographical environment, completes the distributed storage, the computation and the dispatch to the physical target, and all kinds of resources will be

integrated into a dynamic, accurate, scalable, scalable control system, forming a“P2P” control center, so that it becomes the user's terminal and service network. When the system hardware system is a distributed structure, the state data of the electric power system in each level of the regulating center will be transmitted to the integrated pre-processing system of the corresponding level of the regulating center, the pre-processing system of the regulating center at all levels is responsible for the communication between the storage area and the server of the automatic control system at all levels. At this level to perform the corresponding application business, the required business resources by the next level of control center request, and then transferred to this level. At the same time, the dispatching automation system at all levels should give strict feedback to the dispatching center of the higher level, and give feedback to the operation of the power grid (Zhang Zhiyuan., 2021). Compared with the traditional architecture, the main features of the distributed scheduling automation hardware system are as follows: 1, the data information of each control center can be shared transparently, which improves the integration ability of multi-source information in complex power network. 2 open and flexible scalability, the computing resources, storage resources, etc. in this kind of architecture can control the in and out of the system to a certain extent without affecting the normal operation of other infrastructure. 3 self-organization, through the intelligent management of the scheduling automation support system, the regulating system at all levels can work together and form a flexible network.

2.3 The Operation Mode of Scheduling Automation Management

The various phases of the automatic scheduling system shown in Figure 3 can be divided into three levels of operational models. In the security protection system, it is mainly constructed by the security protection and authority management application of the scheduling support platform at all levels, it should be included in all kinds of means and tools such as firewall, data encryption, digital signature in data communication network, it is also the only access to the system for staff. The dispatching data network links up all levels, the real-time monitoring and early warning of the dispatching automation platform, the dispatching plan and the safety school, and the checking of the two application areas, to make the distributed architecture logically and functionally an integrated and organized scheduling system [Ding Xinzhong., 2019] . The implication of regulation mapping is that there is an interactive relationship between dispatching automation system and physical power grid. In this process, data information and control instructions can be transmitted not only vertically, but also laterally, and between different scheduling systems, it is a logical link between the platform and the primary and secondary equipment of the power grid.

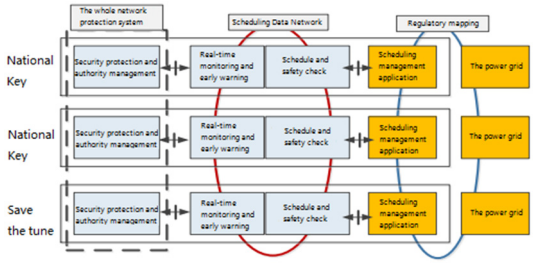

Figure 3: Operation Mode of power grid dispatching automation management.

Because CORBA technology can seamlessly connect multiple target systems, it provides an interactive capability for applications on different computers in a heterogeneous distributed environment, therefore, the cooperation performance between remote workstation software and scheduling host software realized by CORBA technology is better. During the run time, the object requirement provided by the distributed object soft bus is used as the media to dynamically direct the connection with the scheduling system according to the real-time requirement. The system can coordinate better than pure data communication.

3 CONCLUSION

With the development of society and the innovation of Technology, the construction of power system can not stand still, the operation and management of power system become more and more complex. Power grid dispatching automation is a large-scale, complex, system systems engineering, its technical fields, multi-disciplinary cross-cutting are very strong. In the aspect of dispatching automation system design, the wide area system architecture with distributed architecture can adapt to the operation and management of large power grid under the integration of regulation and control, which will effectively improve the level of power grid dispatching technology, we will support power

grid construction and economic and social development, and help power grid reform move forward. In the aspect of dispatching automation, we should not only digest and perfect the existing regulation technology and mode, but also achieve technical breakthrough and practical application in key fields. In general, the construction of power grid dispatching automation has a great development space in the future, but also has a good application prospects.

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