Application Strategy of Electrical Automation Technology in Power System Operation

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Abstract: Global Power Generation Technology, Transmission Technology and Power System Scheduling Technology Are Progressing with the Construction Strategy of Related Systems and the Research and Development of Advanced Power Equipment. Electrical Automation Technology is the Key Technology of Power System Operation, Which Not Only Ensures the Stability of Power System Operation, But Also Improves the Intelligence of Power System Operation. in This Paper, Based on the Development of Electrical Automation Technology, Its Application Strategy in Power System Operation Will Be Analyzed. in This Paper, the Advantages and Development Direction of Electrical Automation Technology Will Be Analyzed, and Its Application Scheme in Power System Will Be Pointed out.

1. Introduction

Nowadays, the Operation of Large-Scale Substation and Power System Integrated Network is Inseparable from Electrical Automation Technology, Which Provides a Safe and Reliable Guarantee for the Reasonable Dispatching and Healthy Operation of Power Grid [1-4]. the Degree of Automation of Power System Determines the Rationality of Power Grid Equipment Allocation, the Reliability of Power Consumption of Power Grid Users, and It Also Controls the Power Grid Load, So as to Make the Power Supply and Power Load Phase Balance [5-8]. Electrical Automation Technology Also Plays the Function of Fault Inspection, Fault Processing and Fault Analysis in the Operation Process of Power Grid System. When the Power Grid Fails, It Will Respond in Time and Deal with Relevant Fault Information to Ensure the Safety and Time of Power Consumption [9-10]. Therefore, It is of Great Significance to Develop a Reasonable and Reliable Power System Operation Strategy Based on Electrical Automation Technology.

Based on the Above Discussion, a Large Number of Scholars and Research Institutions Have Analyzed and Studied the Operation Strategy of Electrical Automation Technology in Power System. Siemens Company [11] First Applied Electrical Automation Technology to Power System Dispatching, and Its Main Product is Lsa678 Power Automation System; Japan [12] Used the Operation Support System Based on Computer Monitoring System in the Application of Electrical Automation Technology, with the Advantages of Putting Relay Protection Device on the Switch Site; the United States [13] in Electrical Automation Technology in the Application of Power System Operation, Three Strategies Are Mainly Adopted: Real-Time Data Acquisition Strategy, Implementation of Database Establishment Strategy and Human-Machine Contact Strategy; Abb [14] and Other Related Electrical Equipment Manufacturers Put Forward Intelligent Substation System, Whose Main Feature is to Combine Integrated Gis Equipment with Substation Computer Monitoring System, So as to Replace the Traditional Electrical Equipment, So as to Achieve a Large Scale. It Greatly Reduces the Cost of Operation and Maintenance and Greatly Improves the Reliability.

With the Rapid Development of Computer Technology, Semiconductor Technology and Artificial Intelligence Technology, Electrical Automation Technology Will Be More and More Widely Used in Substation and Substation System. Therefore, It is of Practical Significance to Study the Strategy of Electrical Automation Technology in Power System Operation. in This Paper, the Application Strategy of Electrical Automation Technology in Power System Operation Will Be Analyzed Based

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on the Development Status of Electrical Automation Technology. in This Paper, the Advantages and Development Direction of Electrical Automation Technology Will Be Analyzed, and the Application Scheme in Power System Will Be Pointed out.

The Structure of This Paper is as Follows:

The Second Section of This Paper Will Analyze the Advantages of Electrical Automation Technology in Power System Operation, and Analyze the Development Direction of Current Electrical Automation Technology.

In the Third Section of This Paper, Based on the Current Electrical Automation Technology, Its Application Strategy in Power System Operation Will Be Developed.

Finally, We Will Make a Summary of This Paper.

2. Advantages and Development Direction of Electrical Automation Technology

As the key technology of modern power system operation, electrical automation technology has a lot of advantages, which is mainly reflected in the application of power system itself and other technologies. From the perspective of power system itself, electrical automation technology improves the speed and efficiency of power system operation, and it is also conducive to the stable operation of power system. From the application level of other technologies, electrical automation technology improves the application level of modern information technology, which makes a large number of emerging technologies to be integrated in practical application.

The advantages of electrical automation technology are shown in Table 1 below:

Table 1 Advantages and Details of Electrical Automation Technology

Advantages of electrical automation technology	Specific details
Improve the speed and efficiency of power system operation	At the same time, a large number of applications of computer technology effectively achieve the prediction of objective problems, which is conducive to better maintenance of the safe operation of the power system.
Conducive to the stable operation of the power system	Network information technology also makes the control and scheduling of power system more simple and convenient. The application of computer technology also makes the supervision of power system more convenient and simple.
Practical application and integration of emerging technologies	Electrical automation technology includes a series of advanced technologies such as computer technology, automation technology, information processing technology, big data technology and remote monitoring technology. The practical application of electrical automation technology realizes the realization of these technologies.

As can be seen from table 1:

In order to improve the operation speed and efficiency of the power system, electrical automation technology improves the operation efficiency of the power system, solves the objective human factors in the traditional power system control system, and at the same time, a large number of applications of computer technology effectively achieve the prediction of objective problems, which is conducive to better maintenance of the safe operation of the power system. The application of electrical automation technology makes the huge data in the power system be processed and analyzed quickly, and then the operation speed of the power system is improved.

At the level that is conducive to the stable operation of the power system, the automatic information processing technology included in the electrical automation technology makes the data stored in the operation process of the power system be processed quickly and conveniently, thus ensuring the safe and stable operation of the power system. At the same time, network information technology makes the control and scheduling of power system more simple and convenient. The application of computer technology also makes the supervision of power system more convenient and simple.

At the application level of other technologies, electrical automation technology includes a series of advanced technologies such as computer technology, automation technology, information processing technology, big data technology and remote monitoring technology. The practical application of electrical automation technology realizes the practical realization of these technologies.

With the intelligent development of information technology and power equipment, the future development direction of electronic automation technology can be summarized as the following four points, and its corresponding characteristics and application scenarios are shown in Figure 1 below:

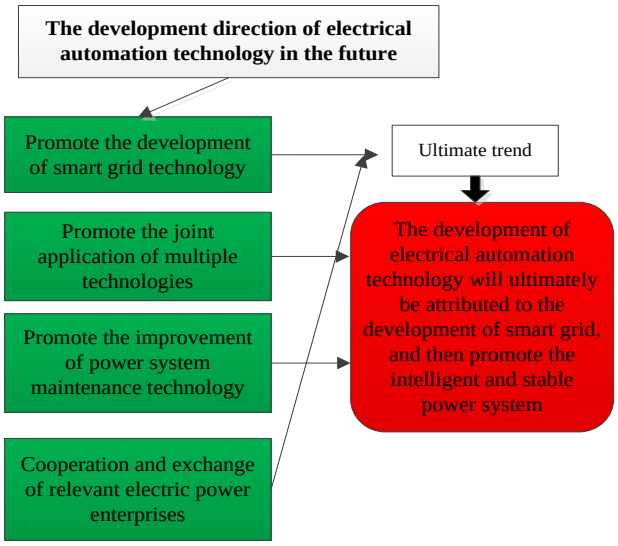

Fig.1 Development Direction of Electrical Automation Technology in the Future

It can be seen from the figure that its future development direction mainly focuses on: promoting the development of smart grid technology, promoting the joint application of multiple technologies, promoting the improvement of power system maintenance technology and the cooperation and exchange of relevant power enterprises. Among them, promoting the development of smart grid technology is the most prominent. The development of electrical automation technology will ultimately be attributed to the development of smart grid, and then promote the intelligent and stable power system.

3. Application Strategy of Electrical Automation Technology in Power System Operation

Based on the electrical automation technology, this paper makes the strategy of power system automation operation. The main technical content of the design is the power system automation operation platform. First of all, in the selection of power system automation operation platform, the group and layer operation platforms are mainly selected, and the corresponding design mode is shown in Figure 2:

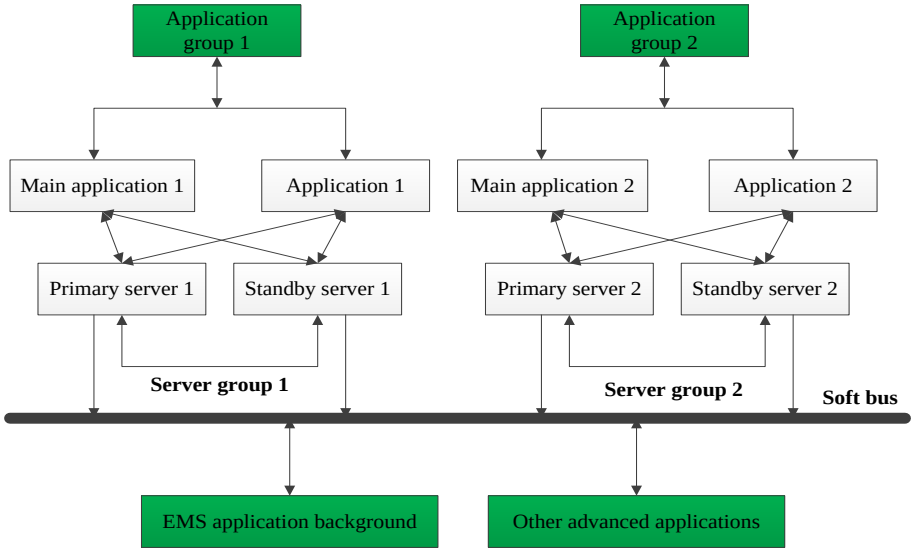

Fig.2 Power System Grouping and Layering Automation Operation Platform

It can be seen from the figure that compared with the traditional power system operation platform, the platform used in this paper classifies applications and services by groups, and the corresponding different groups adopt the hot standby system of main and standby dual machines, and different groups exchange data with different server groups respectively, so as to realize the distributed control of the power system.

At the system management level, the distributed operation management system is adopted, which has four major advantages: network redundancy and dynamic control function, network communication management, data catching function and soft bus access.

At the data management level of power system, this paper adopts distributed database management system. The main details are as follows: the distributed data management system can realize the man-machine access of the system, can easily produce and query data, and can also achieve the deletion of single or group data. Its main application advantages are: consistency maintenance of database, automatic recovery of real-time database, real-time replication of real-time database and image of real-time database.

At the system management level, it is mainly the management of system energy. In this paper, the distributed system management tool is selected in the actual formulation of the strategy. It can realize the distributed management of the equipment, application functions and permissions in the whole system. It has the functions of system running status monitoring, viewing debugging information, remote debugging and process management. At the system network and communication management level, this paper mainly adopts EMS system, which is mainly used to coordinate the computer network and communication network of the whole power grid system. At the system resource monitoring level, it mainly provides computer system monitoring, system network equipment monitoring, real-time operation environment monitoring and performance monitoring. At the system diagnosis level, it mainly provides online and offline monitoring. At the monitoring data processing level, it mainly depends on the EMS system, and sends real-time data services for various performance parameters based on the data provided by the EMS system. At the level of grid model import, it is mainly based on the static mode of XML file. The relevant import process is shown in Figure 3:

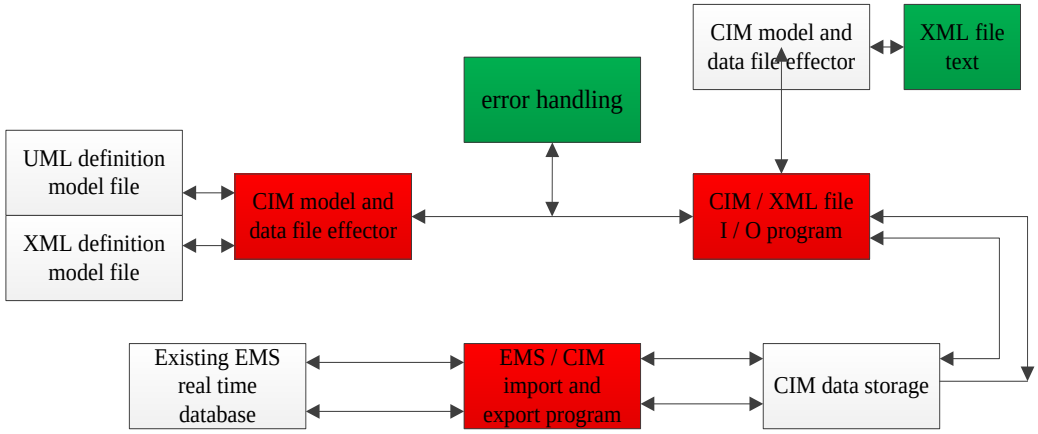

Fig.3 Flow Chart of Grid Model Import

4. Conclusion

This paper mainly analyzes the current research status of electrical automation technology and grid system operation, and specifically analyzes the advantages of electrical automation technology and the future development direction. Based on the above analysis, this paper draws the following conclusion: electrical automation technology is the key technology of power system operation, which not only ensures the stability of power system operation, but also improves the intelligence of power system operation. Finally, based on the current electrical automation technology, this paper puts forward its application strategy in power system operation and analyzes its application details.

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