



Analysis of the effective combination strategy of computer and power system automation technology

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Abstract. With the continuous innovation of science and technology, all kinds of new technologies emerge at the historic moment, providing sufficient data support for the development of the power industry, and driving the power industry towards the direction of automation, intelligence and modernization. At present, the power system automation technology is widely used in the power industry. In order to realize scientific operation and management, improve the security and reliability of power supply, related research put forward the concept of combining technology with application, and pointed out the importance of the application of computer technology in the power system. Therefore, the research on the effective combination of computer and power system automation technology has become a hot topic for experts and scholars at home and abroad. Computer as a complete system of advanced technology, can be regarded as the basis of power system automation technology, power system automation under the blessing of computer technology, help power grid dispatching improvement, innovation substation operation mode, analyze the combination of two technology strategy, help to enrich related research theory, provide the basis for the innovation of electric power industry technology innovation.

Keywords: computer technology; power emergency command system; big data; GIS; communication technology.

1 Introduction

Power automation system, as the main equipment of the power supply, It is an important guarantee to ensure the smooth development of the relevant work of electric power enterprises in order to meet the electricity demand of all kinds of users, In the practical application of the system, Ffunction due to a variety of factors, Based on the current situation of increasing the performance requirements of the power system, In order to comprehensively improve the technical performance of the modified system, To achieve innovative development, We should pay attention to the application of information technology, In particular, the computer technology, This technology helps to promote the operation efficiency and quality level of the power automation system, And dynamic supervision to understand and control the actual situation of the

power automation system. Therefore, through a brief overview of the characteristics of computer and power automation system technology, the research deeply discusses the combination strategy of computer technology and power system automation technology, enrich the research theory of the combination of computer and power system automation technology, and provide technical support for the future development of the power industry.

2 Analysis of automation technology of computer and power system

2.1 Computer technology characteristics

Computer belongs to comprehensive science and technology, involving applied physics, modern communication, mechanical engineering, electronic engineering and other fields. The operation and logic functions of the computer are mainly realized by the central processing unit, main memory, channel or I / O processor, and various external equipment controller components. The central processing unit is at the core. The research results of the operation algorithm play an important role in accelerating the four operations, especially the multiplication and division operation. With the decrease of the device price, the carry and shift time is greatly shortened from the logical method. Effectively integrate all kinds of data and information, accurate analysis and processing and realize data resource sharing, through the comprehensive processing of data and information, improve the accuracy of various data and information, at the same time with a strong data and information storage capacity.

2.2 Characteristics of electric power system automation technology

Power supply is based on the power system as the benchmark, with the development of science and technology and the progress of The Times, automation became the main direction of mechanical system development, according to the development concept, in a variety of science and technology to form the power automation system, in the form of automated operation, change the traditional artificial operation mode. Based on the components of the system, the substation, distribution network and power grid dispatching are all developing in the direction of automation, informatization and intelligence[1]. Compared with the traditional power system, this innovative power system can carry out the fine management of relevant data information according to the way of collection, classification, integration and phased processing, so as to realize the real-time supervision of the whole power system according to the intelligence of the automation system.

3 The Application of Computer Technology in Electric Power System Automation

3.1 Automation of power plants

According to the current operation status of the power automation system in power plants, With the application of computer technology, The most common use is the decentralized control system, The protection and measurement and control device of the decentralized control system is mainly installed in the switchgear, According to the communication management machine and the background machine, Although it can play an effective detection of the automatic operation state of electric power, But requires the application of multiple computer devices for decentralized control, The relevant parameters of different control stations can be transmitted to various data information to the CRT of control stations according to the communication mode. The system fully embodies the computer technology of information efficiency, its helps to promote power plant automation, make the plant of the original control system to control function decentralized and automatic connection and control system, make the power plant operation more scientific, normative and rationality, table 1 for the power plant automation data acquisition frequency.

Table 1. Frequency of automatic data collection in power plants

Order number	Data item	Data minimum interval requirement
1	Real-time three-phase voltage, and current	15min
2	Real-time three-phase total and phase-separation active power	15min
3	Real-time three-phase total and phase-separation reactive power	15min
4	Real-time power factor	15min
5	Positive and reverse total active power energy value	15min
6	Positive and reverse total active power energy value	Hour freezing, daily freezing
7	Electric energy freezing time	The hour, day

3.2 Automation of power grid dispatching

Power grid dispatching automation can make use of the technical characteristics of computer remote control to achieve the low cost of work in the form of reducing electric energy production, delay the investment cycle to improve the economic benefits in the process of power grid operation, and provide good conditions for the effective operation of the funds of electric power enterprises. Based on the current regional division of China's power grid dispatching automation, it covers provincial and municipal power grid dispatching, county-level power grid dispatching, district-level

power grid dispatching, degree and national power grid dispatching[2]. Based on the registration of provinces and counties, the scale of the scheduling is small, so in the selection of servers and workstations, is on the basis of more common commercial PC is given priority to, but for scheduling larger national power grid, to choose more capacity server and workstation to realize automatic scheduling, based on the application of computer technology, power grid scheduling configuration visible table 2.

Table 2. Configuration of power grid dispatching

Power grid scheduling configuration		
Circuit	Line form	Overhead insulated wire / cable
	Line structure	Double-ring net / double-loop radiation
Segmentation and sub-connection	Power supply radius (km)	≤ 7
	piecewise	Circuit breaker / ring network cabinet
	branching	Comply with the switch / cable branch box
With change	Public transformer (main trunk line)	The column changes / box changes
	The user becomes	power distribution room
SVC	distribution transformer	Automatic reactive power compensation
	medium-voltage line	Generalized reactive power compensation
Robotization	monitor	Intelligent monitoring device
	Distribution network automation	Main station feeder automation

3.3 Substation automation

As an important equipment for the supervision of the power automation system, the substation can understand the operation status of the power automation system in real time, find the fault problems in time, and provide the basis for the work of reporting and fault handling, so as to solve the fault problems in a short time. Under the application of computer technology, promote the significance of substation automation is to change the traditional form of operation, by artificial regulation into intelligent, information system regulation, not only can reduce the output of labor cost, reduce the related personnel tasks and pressure, also can completely avoid the phenomenon of artificial error in the actual regulation, to highlight the advantages and characteristics of automation, intelligent operation. In substation automation, can according to the application of computer technology to realize the different equipment in the substation system information sharing and efficient communication, makes the related equipment in information transmission and acquisition more accurate and efficient, with high precision operation way to complete the dynamic regulation, measurement and coordination of each equipment operation control task, make the substation data transmission with efficient information way, specific process below in figure 1.

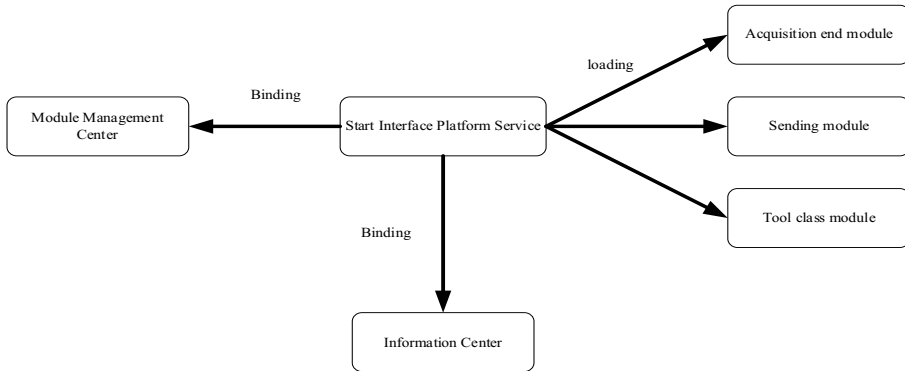


Fig. 1. Operation Process of the substation system

4 The strategy of combining computer and power system automation technology effectively

4.1 Scientific application of the PLC program

In order to promote the effective combination of computer and power system automation technology, the application of PLC program, combined with the characteristics of the program operation, help to optimize the power system programming, and on the basis of computer application, combined with PLC program, improve the level of power system automation operation and management, realize the power system operation fault accurate detection, timely find the fault point, provide timeliness for system troubleshooting work, and reduce the system maintenance cost^[3]. At the same time, the application of PLC program can also optimize the operation mode of the substation, select reasonable, standardized and post-scientific operation parameters, and enhance the stability and safety of the automatic operation of the power system^[4]. The names and operating parameters of the monitoring items of each substation unit are shown in Table 3.

Table 3. Substation monitoring items and operating parameters under PLC program application

Unit name	Monitor the name of the project	unit	operational factor
High voltage unit	rated frequency	Hz	55
	rated voltage	kV	6 12 33
	The highest operating voltage	kV	6.8 11.6 40.2
	Power frequency withstand voltage to ground and interphase / isolation break	kV	38/38 44/49 96/120
	Lightning impact and voltage resistance to ground and interphase / isolation break	kV	65/70 75/85 190/210

	rated current	A	400 645
	Rated short-time current	kA	12.5 (2s) 15 (2s) 18 (2s)
	rated voltage	V	380 210
Low voltage unit	Rated current of the main circuit	A	100-3300
	Rated short-time current	kA	15 32 40
	Rated peak order to with- stand current	kA	30 60 110
	branch current	A	10-800
	rated capacity	KVA	60-2000
Transformer unit	impedance voltage	%	4 6
	tapping range	-	$\pm 2 \times 2.5\% \pm 5\%$
	Connection group	-	Y ynQ DynH

4.2 Intelligent control of the power system frequency

In the automatic operation of the power system, the frequency of the power system will change constantly, and the large fluctuation is not conducive to the stable operation of the power system. Therefore, in the combination of computer and power system automation technology, it is necessary to rely on the static frequency characteristics of the active power of the power supply and the motivation power characteristics to ensure that the power system frequency tends to be stable, so as to give full play to the efficiency of computer technology application[5]. In the automatic operation of the electric power system, if the motivation is the setting of automatic rate adjustment, the mechanical power, angular speed and frequency equations of the electric power system are expressed as follows:

$$p_m = C_1 \omega^2 = C_1 f - C_2 f^2 \quad (1)$$

Generally, the medium angular speed of the generator is determined to be 2 with a given speed of 3000 turns / min and a frequency of 50Hz.

If the angular speed represents the automatic frequency of the power system, the equation is as follows:

$$f = \omega / 2\pi \quad (2)$$

The equation of the rotor motion is as follows:

$$MT - ME = \triangle M = J^* d\omega / dt \quad (3)$$

Computer and power system automation technology, will make the single machine system frequency with the change of sinusoidal form voltage, changing, the application of computer technology, to effectively improve the overall operation efficiency of power system automation, high attention to the change of power system frequency, significant, power system frequency is an important parameter of power network system, each power system has suitable system operation characteristics of the fixed frequency, the combination of computer technology, the power system frequency

change range control for $\pm 0.5 \sim \pm 1\text{Hz}$, to the safe and stable operation of the unit, provide guarantee[6].

5 Conclusion

In conclusion, in terms of stable power supply, also need to ensure the normal operation of electric power automation system, on the basis of the application of computer technology can improve its operation efficiency, and strengthen the security and security of stability, to work in People's Daily life and work to provide important power energy, to maintain social harmony and stability, under the long-term stable power supply, to the national economic development and modern society construction, is of great significance. To increase the power enterprise computer technology popularization and promotion, realize the computer and power system automation technology, also need to pay attention to the application of PLC program and power system frequency control, adopt scientific application and intelligent control, for computer technology in the power system automation, provide guarantee, improve the overall efficiency of power system automation, to promote the development of the power industry to achieve long-term stability.

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