The Design of Power Security Defense System Based on Resource Pool Cloud Computing Technology

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ABSTRACT

In order to realize the power system defense security, this article puts forward the idea and method of constructing power dispatching automation systems with a cloud computing architecture and realizes the unified management of distributed resources with server virtualization technology. Real-time online migration of each module of the scheduling system is realized by using the in-memory data transfer technology. The multi-node network heartbeat detection technology is used to realize the complete monitoring of the server cluster. In the form of an independent disk array, the fault node is removed, and the service is restored automatically. The whole disaster reserve of the system is realized by means of remote resource mapping. System analysis results show that compared with traditional architecture, the service interruption probability of the new scheduling automation system is effectively reduced. Fault redundancy capacity in the station is increased from a key module 2 node to multi-node protection of all modules.

KEYWORDS

Cloud Computing, Power System, Scheduling, Security Defense

1. INTRODUCTION

The inevitable trend of the development of intelligent and automatic power grid technology is that it realizes the strong resource optimization allocation ability and higher safe and stable operation level with highly intelligent production system, and realizes the “plug and play” of various types of power generation and energy storage systems at all voltage levels. In this context, the power grid must have a highly reliable dispatching automation system and efficient operation specifications. With the deepening of the construction, many power management organizations and power enterprises around the world have emphasized the importance and urgency of improving the level of dispatching automation.

Reliability and availability are important for scheduling automation systems. With the continuous expansion of power grid scale and technology, the scheduling automation system still takes two-cell standby as the basic structure to ensure the stable operation of the system, so that when one of the nodes fails, the standby node will take over the original work. This technology has been used for decades, its design principle has not been up to the requirements of The Times, there are problems such as the difficulty of increasing redundant nodes, the difficulty of self-healing after failure, the complexity of equipment installation, the complexity of using configuration process and so on. What makes the technology work for decades is that there are no effective new technologies to solve these problems.

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In order to obtain higher reliability, the hardware investment in the whole scheduling automation system takes up a higher and higher proportion. This trend not only causes the overall construction cost of the system to rise sharply, but also causes the energy and labor cost required for the system operation to rise, while the resource utilization rate of the system is declining, resulting in a huge waste of funds.

Traditional power dispatching work lacks flexibility and security, dispatchers can only complete the operation monitoring and instruction distribution of the power grid in the dispatching room. With the rapid development of smart grid technology today, dispatchers will face more complex grid problems and may need the assistance of on-site personnel or the guidance of more experts. On this premise, scheduling automation system is required to provide more flexible and safe operation mode, realize mobile scheduling and collaborative scheduling, and further ensure the timeliness, accuracy and security of scheduling work.

In the long-term construction of dispatching automation system, the power grid management departments at all levels have formed a variety of different schemes due to the limitations of the hierarchical management system. There are some problems such as ununiformed technical routes, inconsistent operating procedures and uneven management levels. In the traditional ideas upgrading, means the repeated investment and construction, under the framework of heterogeneous not only difficult to implement, the corresponding integration, operation, management and maintenance of the intensity of labor and technical difficulty will increase significantly, at the same time also make manpower, electric power, space and technology cost will increase sharply, it is difficult to control the overall cost. Therefore, an effective method is urgently needed to solve the overall construction scheme under heterogeneous conditions.

The development of cloud computing and its virtualization technology provide effective tools to solve these problems. Based on the resource abstraction and integration capability provided by this technology, wide-area service distribution capability and good reliability, expansibility, economy and other characteristics, this paper takes the transformation of power dispatching automation system architecture as a new idea, reasonably avoids the obstacles caused by heterogeneous systems in various regions, and realizes the comprehensive improvement of multi-area system capability. Cloud computing describes a new internet-based IT service growth, use, and delivery model, usually involving the provision of dynamically scalable and often virtualized resources over the Internet, which is essentially the internet-thinking computing service model. Currently, several types of services are available, including infrastructure-level services (IaaS), platform-level services (PaaS), and software-level services (SaaS). It can be anywhere at any time, convenient and on-demand computing resources sharing can be configured from the pool of resources you will need to obtain (such as: network, servers, storage, applications, and bus service), resource pool can quickly supply and release, to manage resource workload and interactions with the service provider to reduce to a minimum.

So, in this article, based on the cloud computing technology of resource pool, the design of resource pool architecture, system resources and scheduling platform network is first carried out on the power security defense system, and then relevant tests are carried out and test results are obtained.

2. LITERATURE REVIEW

In the 1990s, China ushered in the second technology introduction, focusing on the support platform of EMS and AGC. Wesdac-32 system was introduced from Westinghouse, UK, HABITAT support platform and AGC software from ESCA, USA, and SPECTRUM distributed system from Siemens, Germany replaced H80E system from NDC. By the mid-1990s, China has been able to independently develop advanced SCADA system and EMS application software, and the development and application of SCADA/EMS have reached the international advanced level (Fang, Zhu, Xu, Zhang, Zhou, Kan et al., 2017). Independent intellectual property rights EMS support platform and application software came out successively. In 1994, the sd-6000ems system of nanziyuan was put into operation in zibo

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