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The Research on Remote Control Technology of Power System Operation Cockpit Based on Application Virtualization

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Abstract

With the development of smart grid construction of China Southern Power Grid and the promotion of the integration strategy for power grid companies at all levels, the power grid operation system will gradually become standardized, integrated and intelligent. Since the requirements of safety and stabilization for dispatching are growing, the problem of managing multiple power grid operation systems should be solved urgently. However, with complicated structures, POC(Power System Operation Cockpit) is difficult to monitor and control these operation systems. For the reasons above, this thesis presents a remote control technology based on application virtualization. This technology achieves the remote monitoring, controlling and management of various heterogeneous power grid operation systems by building application delivery centres as well as servers and virtualization clients, provided both secure and efficient remote access across applications. It provides technical supports for integrated monitoring and controlling of operation systems.

Keywords: POC, Power Grid Operation System, Application Virtualization, Application Delivery Center, Remote Transmission

1. Introduction

With the development of smart grid construction of China Southern Power Grid and the promotion of the integration strategy for power grid companies, the power grid operation system will gradually become standardized, integrated and intelligent.

In electric power dispatching department, operation systems are various, large amount and structure complex. And each system is independent such as all levels of OCS(Operation Control System),

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DMS (Distribution Management System), Metering System and so on. In order to make it convenient to across-system control, manage and preserve, the requirement of data sharing and application integration of operation systems is more and more intense. IEC (International Electrotechnical Commission) recommends to use SVG (Scalable Vector Graphics) and CIS (Component Interface Specification) to solve the problem, but the actual application effect is not good. China Southern Power Grid company bring out OS2 (Operation Smart System) series of standards which specify that the data interaction among systems should via OSB (Operation Service Bus) and the presentation of comprehensive data as well as remote control should via POC (Power System Operation Cockpit) [1]. Remote control include interface calling and application remote controlling between horizontal and vertical systems [2][3][4].

For the reasons above, this thesis presents a remote control technology based on application virtualization. This technology, which achieves the remote monitoring, controlling and management of various heterogeneous systems by building application delivery centres as well as remote-control servers and virtualization clients, provided both secure and efficient remote access across applications. It provides technical supports for integration of power grid operation systems.

2. Key Technology of Application Virtualization

Application virtualization decouples the application from underlying hardware platform and operating system, and separates human-computer interaction logic (For example, application programming interface, keyboard and mouse action etc.) from computer logic. Whenever the users visit the application, only the human-computer interaction logic will be sent to the server-side, which will establish independent communication space, and the calculating logic will run in this space. After the processing, the changed human-computer interaction logic will be back to the server-side and be showed there. The entire calling procedure is transparent which runs as the local one. Application virtualization mainly resolves human-computer interaction logic capture and remote transmission technology. Human-computer interaction logic capture technology acquires the refreshing information of on-screen graphics as well as the input message of keyboard and mouse timely [5][6]. Capture technology can be divided into two types:

- Based on underlying window system of the operating system or underlying device driver;
- Using frames comparison technology, which costs the processor’s resource, captures the messages at the level of applications.

Even though the first one is more effective, it requires the users to comprehend the underlying operating system deeply. Human-computer interaction logic remote transmission solves the demands of high compression and encryption transmission. Its transmission effect is trapped in network resources condition, which directly affects the user experience.

Application virtualization can centralize the application systems and deploy, which allows the remote devices to access any applications without deploying its client software. Any application systems of power system can be centralized controlled through application virtualization technology. Therefore, to rapidly combine the organization business is viable and convenient. The users can remotely and transparently interact various business systems in different domains via network. This not only achieves high-efficiency visit of the business systems on the low bandwidth, but also avoids deploying resources, like lots of equipment and high speed network, at home. Additionally, the security of information is another significant consideration. Application virtualization can sufficiently prevents any steals or reveals of sensitive information and intellectual property in the aspect of equipment and transmission.

Since application deployment is above of the application server operating system, application virtualization technologies in various operating systems exits difference. For instance, the difference
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