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Practice the Mobile Imaging Reading Relay on Virtualization Technology

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Abstract

In recent years, with the rapid development of the virtualization and mobile technology, it is coming true to realize the mobile imaging reading by using mobile equipment and virtualization technology. When doctor access the imaging reading application, the doctor will only need to send a simple message to server, the server will establish an independent session for the doctor; the imaging reading application will run on the session and show images on the user's mobile equipment like running on the local computer. It not only can improve pacs system performance, but also can predigest maintenance by using virtualization technology.

Keywords

mobile imaging reading, virtualization server, virtualization application

1. Introduction

In recent years, with the advancement of hospital information construction, the level of medical information and office automation has been greatly improved, which is an important part of medical treatment. With the rapid development of virtualization technology and mobile technology, the use of mobile devices to achieve the possibility of reading a film came into reality, with the improvement of application in the hospital, this way can bring more convenience Sexual and timeliness for doctors' medical services.

Shanghai Chest Hospital is a three-level first-class specialist hospital with diagnosis and treatment of heart, lung, esophagus, trachea and meditational diseases. There are more than 1,800 available beds. More than 1,100 workers are admitted. There are over 47 million patients in and out. In recent years, with the hospital information construction promoting vigorously, medical information, office automation level has been greatly improved. But clinicians still use the computer in a fixed location on the ward reading the traditional model of the computer, when the rounds cannot read the film to the clinic service inconvenience, doctors do not have to rigidly adhere to a computer terminal to read the film before the

demand is also growing. Through the practice of Shanghai Chest Hospital, the use of virtualization technology to provide desktop mobile device to move the mode of reading, doctors in the rounds, teaching and other scenarios to use, which not only changed the traditional service model, improved the Doctor satisfaction and quality of diagnosis and treatment, but also can reduce equipment renewal and routine maintenance costs, and strengthen the clinical departments of health care workers work efficiency.

2. General Architecture

Traditional reading is a doctor in a fixed computer terminal, the use of radiation information system Radiology Information System (RIS) system access to medical image archiving and communication systems Picture Archiving and Communication System (PACS) system image data. If you want to convert the doctors move the way at any time access, relying on a single technology cannot support the requirements of the entire system architecture needs to be a positive change in the overall planning. Information management departments need to use virtualization technology to build a basic platform, and on this platform based on the RIS and PACS application virtualization, then the doctor can be in the case of wireless network coverage, in the application Front-end on-demand use of mobile devices such as IPAD to open the remote release of the reading application, the completion of the doctor's diagnosis of the purpose of the required reading request.

3. Construction Content

3.1 Merging Integration of Information Framework

To achieve the goal of mobile reading, the first need to solve the problem of data integration and integration. As the mobile reading data from the PACS and RIS systems, the two systems may be the same vendor to build, there may not be the same vendor building, the data between the systems need to be associated. In order to solve the problem that the systems are independent of each other and do not share with each other, a reasonable data access structure should be adopted to integrate the data storage of PACS system and RIS system into a data source, and the application program can access both data spaces simultaneously.

Using VMware and other virtualization software to merge the physical server consolidation. In the integration process, the first classification of existing physical servers, in general, the use of highly configured server as the main platform, and then install the server platform configuration components to achieve in a physical server can generate multiple servers for each the server provides related resources. Through this process, the performance and operation of each server are the same as traditional single physical servers. In recent years, more and more hospitals have begun to use blade servers and blade cages to build server clusters.

3.2 Managed Extensions for Viewing Applications

After the information frame is merged and integrated, the computing and storage resources can be quickly and centrally allocated to the PACS system and the RIS system from the existing server clusters. Traditionally, when the server or data storage resources are insufficient, the application points to be split, buy a new server, the resources owned by their respective servers cannot be shared. When the server cluster, the lack of resources when the Department of Information only need to purchase a physical server, and then join the existing server cluster can increase the server resources to achieve application resource sharing load balancing and non-stop dynamic expansion purposes.

Hardware resources are provided on the one hand, the software can be managed transformation is another fulcrum. Need to be through the doctor workstation desktop reading program virtualized hosted on the server side, the front desk can be accessed. In general, the application software of client and server (Client/Server, CS) cannot be applied to the application. It needs to modify the software to be a browser and server structure (Browser/Server, BS) to be released. Traditional CS architecture client application maintenance, need to the client for maintenance, environmental impact factors, consumption of information management staff a lot of time, managed expansion, the information management staff only need to maintain the server-side application desktop can be completed The previous cumbersome maintenance.

3.3 Image Data Transmission Processing

In the PACS access, the image data transmission processing is the focus of work. Because the PACS system to save a considerable amount of image data storage, such as radiology CT, MRI, and nuclear hospitals, ultrasound, pathology, bronchoscopy and other types of inspection to form a large number of data. Compared to the image data, RIS reports only a small part of the data. According to statistics, clinicians in the access, when more than 3 seconds will feel more slowly, and to the existing fixed cable network Gigabit/sec, a CT film to produce 300M image sequence to a fixed wired network access The need for 3-5 seconds or so, and the existing 802.11n is the hospital more commonly used transmission protocol, up to 300M/s, seemingly wireless network speed than the wired network is poor, will have a longer access time, clinical Will have slow access to the feelings.

In reality, the adoption of virtual publishing technology, the traditional sense of transmission from the data center storage in line with medical digital imaging and communications (Digital Imaging and Communications in Medicine, Dicom) standard data to the doctor's client front end, changed from the data center Of the storage is passed to the data center server cluster, which through the switch less, and generally only through the network 10 Gigabit core switches. The doctors refer to the client to get from the server cluster is not already no longer compressed Dicom data, but after a specific algorithm to compress the desktop data. The author tests, even for some catheter room DSA photography and other dynamic records, the data generated per second can reach more than 8M, the use of desktop compression data transfer processing, access to doctors in the mobile terminal is still very smooth.

3.4 The Access of Doctor Mobile Application

Reading application program structure is built on top of the server, the hospital reading applications are mainly doctors workstations, mobile devices, these prospects are the same as the application needs to consider more purely technical issues, is Practical applications such as equipment pixels, size, and how the device lock the public custody of the actual situation considerations. Because multiple scanners run on concurrently shared physical resources such as servers, CPUs, memory, network connections, and storage, you can use this feature to create exactly the same view template for your doctor.

The doctor runs the reading template program on the PAD. The program accesses the remote connection server and enters the user name and password. After passing the authentication, the physician will see the desktop assigned to the doctor by the information section manager, and then the fixed terminal Access to RIS, PACS system, image data, operation and the past is exactly the same, without the information department personnel time-consuming and additional training. More detailed operation is to record the doctor's last operating environment, so no matter when the doctor landed, just enter the account number, boot can appear on his last use of the interface, without a doctor and then gradually layer by layer to open the interface.

4. Construction Effects

4.1 To Reduce Costs, for the Ease of Centralized Management

Application of the realization of a very clear cost advantage, due to the provision of mobile reading, do not add the purchase of the traditional sense of the computer or thin terminal, also need not consider the placement of the problem. In addition, information management personnel, you can all similar to the application management to the back-end server, in the Information office to read and other related applications to manage and maintain the hospital doctors are using the same reading Chip program, the administrator for the same application patch, all applications immediately all the updates, greatly reducing the workload of information management staff to speed up the release of the speed.

4.2 To Ensure Business Continuity, to Avoid Compatibility Failures

Read the implementation of data files such as applications is stored in the data center room, rather than the user terminal, so even if the terminal is damaged or lost, just replace the terminal, even the operating system does not require reloading, so for Clinically, to ensure business continuity, speed up the problem-solving response speed. At the same time, because the hospital operating system is not the same, the application calls the dynamic library are not the same, all kinds of dynamic libraries and various types of operating systems compatible with uncertainty, this approach can maximize the different versions of the operating system to avoid And the conflict between the application software, thus ensuring the compatibility of the problem.

5. Summary

Virtualization application in the hospital information construction reflects the obvious advantages, greatly improve the utilization of the server, reduce the cost of hospital information construction, information management staff to facilitate the operation of the hardware maintenance, reducing the application software upgrades of the workload. On the other hand, in the past, doctors only in each ward of the 1, 2 Taiwan fixed computer to read the film, by the location and terminal equipment restrictions. After the construction of mobile reading system, doctors can use mobile devices to read movies at anytime and anywhere under the conditions of rounds, teaching and so on, so as to complete the medical service more efficiently for patients, thus changing the previous diagnosis and treatment mode and improving patient satisfaction. Degree, to improve the hospital's medical quality management is also of great significance.

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