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First Affiliated Hospital of Zhengzhou University

INDUSTRY	Healthcare
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SOLUTIONS	Virtualization, File and Content Services, Business Continuity and Replication, Enterprise Platform, Modular Platform
	Hardware — Hitachi Universal Storage Platform® V, Hitachi Content Platform, Hitachi Adaptable Modular Storage 2300
	Software — Hitachi TrueCopy® Synchronous, Hitachi Universal Replicator

Hospital Enables Content Archiving and Disaster Recovery for Medical Systems with Hitachi Storage Virtualization

With a total of 3,820 beds, the First Affiliated Hospital of Zhengzhou University is the largest comprehensive hospital in Henan Province, China. In addition to offering a full range of hospital services, the hospital also engages in teaching and research. In 2000, it began to computerize its operations, starting with the inpatient and outpatient departments. As China began to introduce new medical reforms, the hospital found that its existing IT system was lagging far behind its needs. In response, it decided that its entire IT system should be upgraded with Hitachi storage technology to ensure that both the system and applications could meet its ever-increasing demands.

Storage Challenges

Having computerized its operations for 10 years, the hospital already had a basic IT infrastructure that met its primary day-to-day needs. To support the hospital's growth, a number of data storage systems had been deployed over the years. However, these disparate systems were unable to provide a centralized, reliable and effective platform for the hospital to fully utilize, allocate and protect its mission-critical information assets. This also meant the hospital lacked a well-organized, long-term storage blueprint to facilitate disaster recovery, ensure business continuity and support the continual growth of its IT infrastructure. Crucially, this inadequate IT system was also constricting the hospital's development and its ability to adapt to rapidly changing medical reforms.

Project Goals

The new system was intended to improve the security of the hospital's data center while also significantly enhancing its data processing speed and efficiency, minimizing system sprawl, and ensuring all business applications and software were able to run smoothly and effectively. Through sophisticated integration of the hospital information system (HIS), electronic medical record (EMR), picture archiving and communication system (PACS) and laboratory information system (LIS), the new data center was expected to establish a hospital-wide system platform. This platform would encompass data storage, backup and disaster recovery solutions as well as deliver robust technical services to enable business continuity during crises and emergencies.

The new system was also intended to meet current and future health reform requirements issued by the state and the Ministry of Health, such as clinical paths and single disease management. The entire system would likewise have to comply with the ever-changing requirements and standardized management methods of the Ministry of Health. It would further be required to support the hospital's exponential data growth with a high level of scalability.

By consolidating its legacy equipment with cloud computing and virtualization, the hospital knew that it could protect its IT investment and establish a state-of-the-art, comprehensive data processing and computing platform, laying a solid foundation for supporting the integration of regional hospital services in the future.

Project Mission

In updating its data center, the First Affiliated Hospital of Zhengzhou University determined a three-part mission.

- Upgrade all the systems in the entire data center.
- Improve the overall performance of the data center, particularly in terms of improving its data processing speed. By linking up different systems with 10Gb connectivity, the hospital wanted to achieve data integration, storage centralization and applications security, thus ensuring that data operations would be smooth, reliable and secure.



The 3DC disaster recovery solution from Hitachi Data Systems provides unprecedented protection from data loss and can survive multiple disaster hits. It not only meets the hospital's rigorous business continuity needs, but it also provides the most affordable and safest data protection strategy.

- Enable high-speed data processing, online backup, storage archiving and disaster recovery. This would include client systems for data processing, blade servers for application processing, I/O management system, database system, SAN Fibre Channel switches and disk storage.

Storage Solutions from Hitachi Data Systems

To meet the hospital's project goals, Hitachi Data Systems provided a storage consolidation solution with industry-leading virtualization technology, a three data center (3DC) disaster recovery solution and an archiving solution.

In the next few years, it is estimated that the hospital's medical data will rapidly increase to approximately 20TB and its PACS medical imaging data will increase to about 80TB.

To meet these demands, the hospital selected the enterprise-class Hitachi Universal Storage Platform® V (USP V) as its core storage system and used high-performance 15K rpm disks for its medical data and 7.2K rpm disks for its PACS imaging data.

With the USP V storage virtualization technology, the hospital consolidated its disparate

storage systems to create a centralized storage resource pool. This storage infrastructure is scalable and enables centralized management and storage provisioning. At the same time it ensures investment protection, improves the storage utilization ratio and lowers maintenance costs.

The hospital also deployed a Hitachi Content Platform (HCP) to satisfy the archival requirements of its PACS data. HCP is a write once, read many (WORM) based storage solution that provides raw data archival and indexed search capability, as well as digital fingerprint authentication technology to ensure all archived data is secure.

For data security and business continuity, the hospital also implemented an advanced 3DC disaster recovery storage solution with three sets of USP V storage systems. By combining the advantages of both Hitachi TrueCopy® Synchronous and Hitachi Universal Replicator asynchronous data replication (HUR), the 3DC solution provides a bulletproof storage architecture that can survive multiple disasters. Thus, it ensures the highest levels of business continuity and data security (see Figure 1).

Three Layers of System Interoperability

In recognition of the importance of system interoperability, this new storage infrastructure was designed to address the needs of the host layer, the network layer and the storage layer.

Host Layer

The host server is mainly responsible for data processing and managing the database. Hitachi Data Systems recommended that multiple HBA cards should be used in order to increase the data paths for greater accessibility.

To control the workload among different paths, a sophisticated data path management software was also installed to facilitate load balancing. In addition, path failover capability ensures system resiliency by automatically switching between data paths in case any path fails.

Network Layer

The hospital's SAN connects the host servers and the storage system. As such, it plays an important role in providing a highly flexible and scalable environment for future system growth.

The design of the new SAN architecture focuses on system redundancy. For instance, two Fibre Channel switches were deployed to provide redundant paths between the host servers and the storage devices in the production site. In the disaster recovery site, two more Fibre Channel switches were also installed to provide redundant paths to the storage in the disaster recovery site. These two disaster recovery switches also provide remote link connections with the primary switches to allow synchronous remote copy from the primary storage to the remote storage in the disaster recovery site. For extended connectivity between the production SAN and the disaster recovery SAN, a single mode long-wave module was used in each Fibre Channel switch.

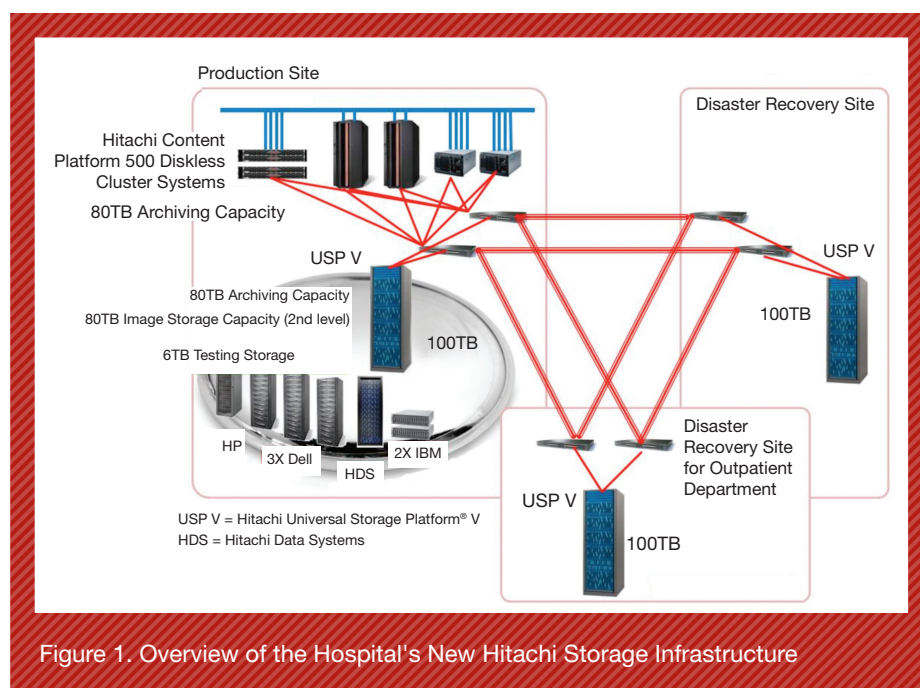


Figure 1. Overview of the Hospital's New Hitachi Storage Infrastructure

Storage Layer

The core of the SAN is the disk storage systems. After taking its future development into account, the hospital installed three sets of high-performance disk storage systems. Each can support heterogeneous virtualization and 3DC solutions. The disk storage at the production site core business functions and day-to-day operations such as HIS, EHR, PACS and other data archives, while the disk storage at the disaster recovery site is used for data recovery in case of disaster.

Immense Benefits

The hospital's goal is to establish a sustainable, high-tech storage infrastructure that allows central management of its multiple heterogeneous storage systems and also meets its mission-critical storage requirements in terms of capacity, performance, reliability, archival and disaster recovery. With Hitachi storage solutions, the hospital has now consolidated its heterogeneous storage systems onto a centralized, enterprise-class USP V storage system, enabling effective data archiving and multiple-data-center disaster recovery. The immense benefits from this new system include:

High Price-to-performance Ratio

The hospital's high-end enterprise-class storage outperforms small and medium business (SMB) midrange storage in many aspects and can fully satisfy the hospital's core system applications. With multiple paths for I/O load balancing and path failover capability, the storage can also mitigate I/O bottlenecks

and enables further consolidation and disaster recovery requirements in the future.

High Reliability

A high-end storage platform provides a higher level of reliability and resilience, which is why the majority of data centers now use one as a core system for data protection. The hospital's storage controller uses a hot pluggable module, providing higher redundancy and reliability with easy maintenance. HCP also employs RAID-6 for robust and reliable configuration.

Centralized Configuration and Maintenance

The future trend of high-end storage infrastructure is consolidation. When the hospital started to design its new storage systems, it focused on storage consolidation in order to ensure unified and simplified configuration and maintenance. This centralized resource pool provides a sustainable storage infrastructure that can scale for future system growth and also reduce long-term operation and maintenance costs.

High Levels of Scalability

Hitachi high-end storage equipment provides a variety of advanced functionality, such as virtualization, storage partitioning and HUR disaster recovery solutions. The hospital has fully utilized all these cutting-edge technologies in its new storage system, which ensures it now has a solid and highly scalable foundation for long-term storage that will also support new applications and future expansion.

Open Platform for Content Archiving

The hospital uses a high-capacity SATA disk as the medium for archiving. The advanced HCP archiving function doesn't provide storage capacity. Instead, together with a SAN, the storage space required for HCP archival is provided by the storage resource pool, which is consolidated under the USP V from previous storage systems. The HCP archival solution is an open architecture that is scalable for future growth.

Robust 3DC Disaster Recovery Solution

Developing a comprehensive and reliable business continuity solution is vital for the hospital. Its 3DC disaster recovery solution from Hitachi Data Systems provides unprecedented protection from data loss and can survive multiple disaster hits. As the industry's leading disaster recovery solution, 3DC not only meets the hospital's rigorous business continuity needs, but it also provides the most affordable and safest data protection strategy.

By successfully implementing this state-of-the-art storage infrastructure, Hitachi Data Systems has helped the First Affiliated Hospital of Zhengzhou University build a solid foundation for future growth. Looking ahead, Hitachi Data Systems will continue working with the hospital to help it manage and maintain its new system in a way that maximizes its unsurpassed capabilities in capacity management, disaster recovery management and data search.

Hitachi Data Systems Corporation

Corporate Headquarters

750 Central Expressway
Santa Clara, California 95050-2627 USA
www.hds.com

Regional Contact Information

Americas: +1 408 970 1000 or info@hds.com
Europe, Middle East and Africa: +44 (0) 1753 618000 or info.emea@hds.com
Asia Pacific: +852 3189 7900 or hds.marketing.apac@hds.com

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