

“By building our private cloud storage based on Hitachi Unified Storage VM, we can not only migrate massive data in a short time successfully, but also implement multiple leading-edge storage technologies on a single platform. Private cloud storage is a feasible solution instead of an abstract concept.”

*Zhang Yi, Director, Information Center, The First People's Hospital of Yibin*



## HDS Helps Build Private Cloud Storage, Ensures Stability and Efficiency for The First People's Hospital of Yibin

As The First People's Hospital of Yibin, a leading city hospital, expanded its operations, its data grew as well. Recognizing the inadequacies of its obsolete infrastructure, the hospital began searching for a new vendor to implement a private cloud system to improve performance and security, increase scalability, and reduce downtime. The hospital considered various approaches and opted for a private cloud solution from Hitachi Data Systems. Based on Hitachi Unified Storage VM with flash storage, the HDS solution allowed the hospital to achieve that goal.

### About The First People's Hospital of Yibin

Located at the center of Yibin, in China's Sichuan Province, The First People's Hospital of Yibin is a modern Level-3 Grade-A general hospital that integrates healthcare, teaching, research and prevention. The hospital has A, B and C branches with a bed capacity of 1,395 and 2,000 actual open beds. Led by the management team, the hospital is comprehensively implementing a "digital hospital." It has established a pioneering healthcare quality management information system and created a collaborative healthcare service network across urban and rural areas.

### The Challenges

As additional beds brought more rapid data growth to the hospital, it was challenged to manage it all with obsolete infrastructure. Its existing HP storage had performance bottlenecks, and its core database suffered from unbalanced performance. In addition, the hospital determined that performance tuning by application developers might be cost and labor intensive, with no guarantee of the expected results.

The core business systems of the hospital included hospital information systems (HIS), clinical information system (CIS), laboratory information systems (LIS), electronic medical records (EMR) and picture archiving and communication



### The First People's Hospital of Yibin

**INDUSTRY**  
Healthcare

**SOLUTION**  
Cloud, Virtualization, Data Migration

**HARDWARE**  
Hitachi Unified Storage VM, Hitachi Accelerated Flash

**SOFTWARE**  
Hitachi Universal Volume Manager, Hitachi Dynamic Provisioning, Hitachi Dynamic Tiering, Hitachi Data Instance Manager

**SERVICES**  
Provided by Hitachi Data Systems Global Services

### Benefits at a Glance

- Reduced downtime.
- Improved performance, optimization.
- Increased scalability.

## SUCCESS STORY

systems (PACS). And there were dozens of small edge-service modules. With business development over years, the hospital faced silos of infrastructure. Data center resources such as storage and servers were isolated and unable to share with each other, and, therefore, it was difficult to optimize these systems at a platform level. As a result, any small adjustments to the resources required extremely complicated changes and a long downtime. As business developed, the information department had increasingly reduced planned downtime for system changes.

The protection of user data was also poor. The hospital implemented traditional data backup with a Huawei Symantec backup system. However, the backup window of this system was typically 24 hours at least, and end users cannot tolerate 24 hours of data loss due to such a long backup window. If the storage failed, users faced a dilemma: They lose data for a whole day if they recover data from the backup system; or, they lose control of downtime if they wait for the restoration of the production storage (that is, how long it would take for the maintenance engineers and spare parts to arrive at the hospital). Therefore, it was imperative for the hospital to implement more advanced data protection to avoid the potential risks. Considering all factors, the hospital chose to build a private cloud storage platform to:

- Create a secure and robust private cloud storage platform to centrally store all the business data of the hospital.
- Provide high-performance, stable, reliable and resilient storage for core business databases such as HIS, CIS, LIS, EMR and PACS.
- Offer massive low-cost and highly scalable storage for PACS image data.
- Perform expansion with no downtime (or acceptable downtime) in the future.
- Keep expansion free from vendor lock-in.

### The HDS Solution

For this project, the solution needed to provide a centralized and unified storage platform for all application systems, including HIS, CIS, LIS, EMR and PACS, as well as dozens of small edge services. Consequently, the storage platform had to deliver a higher level of performance, stability and scalability as well as optimization, management and data protection.



HDS recommended building a unified storage platform to centralize all the block-level data. This purpose-built solution for the hospital offers the following features:

#### ■ Storage resource

**pooling.** Hitachi Unified Storage VM (HUS VM) provides advanced storage virtualization that can offer unified management for all leading Fibre Channel storage. With storage virtualization, the hospital can consolidate the existing storage into a unified storage pool, which fully utilizes the existing storage. And the hospital still has the freedom to choose any high-performance storage for future expansion. In addition, the hospital can automatically allocate all data to all disk groups by using the dynamic provisioning of HUS VM. This method can avoid hot-spot disks and optimize the overall I/O performance.

**HUS VM:  
All Flash**

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#### ■ Optimization of core business systems.

By configuring the high-performance HUS VM system with flash, the solution provides three to five times higher read/write performance than that of solid-state disk (SSD) for the core business systems (such as HIS, CIS and LIS databases). This approach reduces the I/O delay of storage to less than one millisecond, thus maximizing the storage I/O performance. In addition, the solution provides an optimal match of capacity and performance to optimize the overall storage pool. It supports automated storage tiering, which retains the hot data on the high-performance flash media, and automatically moves the cold data to the secondary storage (such as the hard disks)

and even the tertiary storage (such as the existing storage). In this way, the solution improves the overall storage I/O performance while reducing the total storage cost.

#### ■ Optimization of application efficiency with quality of service controls.

With the leading-edge storage architecture of HUS VM, storage resources (such as the Fibre Channel front-end ports, globally shared cache and back-end disks) can be allocated reasonably according to the requirements of business applications. This capability can provide services for different business applications from different logical partitions. For example, more cache resources can be reserved for critical business systems, such as HIS and CIS, to improve their access performance. On the less-critical applications, the cache resources for edge service modules are restricted to prevent them from affecting the performance of core business applications, such as backup or other batch operations.

#### ■ Online expansion.

Based on the storage virtualization of HUS VM, virtual storage can be provided for the hosts. Storage can still be allocated as required by the business hosts even if the physical capacity of the current disks is insufficient. When the physical capacity of these disks requires expansion, new disks can be added to the storage pool without any adjustments to the hosts. This capability greatly reduces the efforts and difficulty in expansion and makes nondisruptive expansion possible.

#### ■ New generation of data instance management.

With Hitachi Data Instance Manager software, the hospital can achieve “capture once, multiple protections” for their core business data. After I/O is captured

once on the core business servers, the data can be transmitted to the mirrored protection server in the order of I/O generated. This action delivers mirrored protection, continuous data protection, bare metal recovery (BMR) and online archiving for the core databases. With these features, the HDS solution is well suited to address the requirements of the hospital. The previous infrastructure was unable to provide solutions to help the hospital reduce planned downtime, to consolidate and utilize the existing storage resources, and to support future development.

“By building our private cloud storage based on Hitachi Unified Storage VM, we can not only migrate massive data in a short time successfully, but also implement multiple leading-edge storage technologies on a single platform. Private cloud storage is a feasible solution instead of an abstract concept,” said Zhang Yi, director, Information Center, The First People’s Hospital of Yibin.

## The Benefits

The hospital gained the following benefits from the Hitachi solution:

- **High performance.** With its patented Hitachi Accelerated Flash technologies, HDS helped the hospital build the Tier 1 storage with the highest performance for its private cloud storage. The I/O response time of its core business systems is less than a millisecond. By using HUS VM with flash storage, the I/O performance achieves remarkable and predictable results.
- **Reduced response time.** After the new storage went live, the hospital tested and compared performance to its old system. The response time of typical services such as HIS were reduced by 18% and, for CIS systems, by 30%. In addition, the time to manually back up the back-office data files was reduced by 75%. These reductions were achieved with Hitachi Accelerated Flash, which enables the I/O responsiveness to decrease to less than 1 ms from more than 20 ms.
- **Balance between cost and performance.** With Hitachi Dynamic Tiering (HDT) software, more business applications in the hospital can benefit from the I/O performance improvement by leveraging flash media and the cost savings from extending the life of older storage. The hospital truly achieves automated data

tiering of the core databases with HDT’s unique features, such as optimization of data migration policies for applications and data, and intelligent scenario-based I/O characteristics. I/Os per hour are continuously measured. Frequently accessed data that requires the fastest response times is automatically placed on the internal flash drives in the HUS VM, while less active data is tiered to external storage. The placement of data is based on the policy of an acceptable rate of I/Os per hour for each of the tiers. In order to avoid thrashing of data between the tiers, a buffer zone must be crossed before the data is migrated.

As there are relatively fewer data blocks that call for high-performance access in terms of the service data in the hospital, a lot of data is “cold” and not accessed frequently. For that reason, HDT plays a vital role. It taps fully into the high performance of Hitachi Accelerated Flash drives to provide low-latency access performance for mission-critical data. It also reduces the cost of future storage expansion in the hospital.

- **Minimum planned downtime.** With the sophisticated storage virtualization of HUS VM, the hospital moves dozens of terabytes of data in its older system online in a short time, reducing the downtime window at night. HUS VM can virtualize external storage without the need to change data formats. Therefore, it can roll back to the original storage architecture directly, in case of virtualization failures, avoiding the risks in data migration.
- **Gradual elimination of performance bottlenecks.** The technical transformation in this project helps address the problems in storage I/O first (which was once a key bottleneck suspect.) Additionally, HDS provides professional performance monitoring tools to allow users to focus on bottlenecks in the application layer. Next, users will optimize applications in depth, facilitating end-to-end (the whole I/O path from application end to storage end) performance improvement.

- **Scalable platform.** Based on HUS VM private cloud storage, the hospital can scale to support massive PACS image files as well as object data, such as DICOM and clinical document architecture (CDA) standards, in the future. In contrast, products from other vendors cannot offer such consolidation and unification. On the other hand, HUS VM can scale out to active-active disaster recovery and 3-data-center disaster recovery architecture. The private cloud storage from other vendors cannot offer all these features. “With the HDS migration solution based on its storage virtualization, we migrated dozens of terabytes of data in the PACS system within a downtime window of half an hour, which was unimaginable in the past. And the core storage platform, built with flash architecture, provides ultra-low latency I/O responsiveness for the core business of the hospital. It significantly improves the efficiency of the business systems, such as HIS and CIS. This greatly impressed us,” explained Zhang Yang, technical engineer, Information Center, The First People’s Hospital of Yibin.

The hospital believes that choosing HDS as its vendor in this project is just the beginning of their partnership. As its business grows rapidly and IT develops further, the hospital expects to choose a highly professional, experienced and aligned partner. With its long-term penetration in the healthcare industry, HDS has many success stories in this area, which offers the hospital peace of mind. And the breadth and depth of HDS’ high-quality product portfolio make the hospital feel positive about their future cooperation.

“The HUS VM with flash not only improved the performance of our business systems but also helped build robust and steady storage for the entire data center, providing more agile support for go-live of new services in the future,” concluded Yi.

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