Success Story

Intermountain Healthcare Takes on Big Data with NetApp, Saving US$3 Million in Storage Costs

Intermountain Healthcare
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KEY HIGHLIGHTS

Industry
Healthcare

The Challenge
To provide reliable, ready access to information to improve patient services while managing rapid growth at the lowest appropriate cost.

The Solution
Deploy NetApp® storage systems, leveraging deduplication, thin provisioning, and NetApp Flash Cache™ and Flash Pool™ intelligent caching to provide IT reliability and scalability, and lower the total cost of care.

Benefits
- Save US$3 million in storage costs
- Keep up with 30% annual data growth without adding IT staff
- Provide robust performance to growing VDI user base that wants to deliver enhanced patient care faster
- Reclaim up to 60% of targeted storage capacity with NetApp deduplication

Customer Profile

Intermountain Healthcare is a Utah-based system of 22 nonprofit hospitals, 185 clinics, a Medical Group with about 1,300 employed physicians, a health plan division called *SelectHealth*, and other health services. The organization is widely recognized as a national leader in clinical quality improvement and efficient healthcare delivery. A recent Dartmouth Institute white paper cited Intermountain as a national benchmark and predicted a reduction in U.S. Medicare expenditures of more than 40% if other hospitals nationwide delivered healthcare the way that Intermountain delivers it.

Intermountain has achieved this level of efficiency by focusing on what's best for the patient—emphasizing healthcare quality and value rather than increasing volumes. By delivering healthcare in an evidence-based way, Intermountain has improved medical outcomes, lowered utilization, and significantly reduced costs. That is why President Obama and other national leaders have referred to Intermountain as an "island of excellence" in American healthcare.

The Challenge

Keeping up with big data

Intermountain has always been an early adopter of new healthcare technology and operates one of the largest picture archiving and communication systems (PACS) in the world. Keeping up with 30% annual data growth is one of the IT team's key directives. With imaging and genomics applications creating vast amounts of data, Intermountain expects to reach 15 petabytes (PB) in five years.

"The combination of new technologies and data retention requirements has effectively created a big data challenge for healthcare organizations," says Don Franklin, assistant vice president of Infrastructure and Operations for Intermountain Healthcare. "Reliability is always our most important consideration for any production system, but we also have to keep costs manageable to lower the total cost of care."

Removing storage bottlenecks to virtualization

Virtual desktop infrastructure (VDI) is an example of one technology that's gaining traction within healthcare organizations, enabling cost-effective clinical mobility and more secure

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Don Franklin
Assistant Vice President of Infrastructure and Operations, Intermountain Healthcare

sharing of client terminals. Intermountain was exploring the use of VDI for clinicians to access electronic clinical information systems at the point of care, and the organization needed storage that could handle the I/O load.

"VDI isn't effective if the supporting infrastructure is undersized, and we needed to be sure we had the right storage technologies on the back end to provide good performance," says Franklin.

The healthcare system also needed storage that would allow it to maintain efficiency and performance in its growing VMware® ESXi™ virtual server environment, which accounts for 80% of its Microsoft® Windows® based servers.

The Solution

Space-efficient, reliable storage with multiprotocol support

Intermountain is meeting these challenges with NetApp, which now stores and protects approximately 3PB of the organization's 4.5PB of data. The organization worked with Ciber, a local NetApp partner, to deploy NetApp storage systems at its production data center in Plano, Texas; at a secondary data center in Salt Lake City; and at a third facility in Ogden, Utah. Other NetApp storage systems host file shares and ESXi environments at hospitals.

"We view Ciber as a true partner," says Franklin. "They know our business and have a deep understanding of healthcare IT requirements. We value the high level of trust between us."

Ciber recommended NetApp for many critical workloads, including the healthcare system's VMware ESXi virtual server environment. Microsoft SharePoint®, Microsoft SQL Server® databases, and portions of Microsoft Exchange Server all run in the VMware environment. GE and Agfa PACS image archives are also stored on NetApp. Offering multiprotocol support, NetApp allows Intermountain to choose the connectivity that makes sense for each workload. For example, the ESXi architecture is built on Fibre Channel, VMware View® uses NFS, and Windows file shares use CIFS.

"The NetApp environment offers us a lot of flexibility," says Mike Wood, storage engineer for Intermountain Healthcare. "We can architect solutions to meet the business need using the best protocols without having to add unwanted storage sprawl within our data centers."

Native thin provisioning as well as deduplication and data compression help to maximize storage efficiency. "We've never had an issue with thin provisioning volumes to give people the capacity they request," says Franklin. "The intelligence of the NetApp system helps to protect us from oversubscribing the storage, so we know that our healthcare providers and administrators always have access to data they need, delivered as efficiently as possible."

Accelerating performance with hybrid flash technologies

To provide optimal performance for VMware virtual machines, Intermountain uses NetApp Flash Cache controller-attached PCIe intelligent caching. By caching recently read user data and NetApp metadata, Flash Cache can increase I/O throughput by up to 75%. Because Flash Cache is fully deduplication aware, Intermountain can make optimal use of the cache and further improve storage utilization in its VMware virtual server environment. "NetApp plays a big part in the efficiency and performance of our VMware environment," says Franklin. "It's a great storage platform for virtualization."

Intermountain is preparing to increase its use of VMware View virtual desktops for clinical mobility, and NetApp Flash Pool is an important part of its strategy. Flash Pool mixes solid-state drive (SSD) technology and hard disk drive (HDD) technology at the aggregate level to achieve SSD-like performance at HDD-like prices. Like Flash Cache, Flash Pool is deduplication aware, allowing Intermountain to make better use of its SSD capacity.

"With NetApp Flash Cache and Flash Pool, we were able to deploy a hybrid storage array that accelerates both reads and writes, allowing us to meet the demands of varying workloads," says Wood. "Virtual desktops tend to

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> Storage Engineer, Intermountain Healthcare

be much more write-intensive than virtual servers, and Flash Pool gives us RAID-protected SSDs to accelerate overwrite performance."

A better model for data protection

Intermountain storage engineers appreciate the performance of NetApp Snapshot™ and SnapRestore® technologies, which allow them to recover files quickly from recent, point-in-time copies. Copies of virtual machines or datastores are rapidly created and can be restored from any level of granularity, as needed. NetApp Snapshot technology is the foundation for NetApp SnapManager®, SnapMirror®, and SnapVault® software, offering unified data protection and integration with Microsoft business applications.

Previously, Intermountain backed up all of its data to tape. This required hands-on administration of tape libraries, and backups were not always performed efficiently. Now Intermountain uses NetApp SnapVault software for disk-to-disk backup, while NetApp SnapMirror software automatically replicates backup data between data centers for disaster recovery purposes. Certain data is then transferred to tape and encrypted, enhancing security and compliance.

Intermountain uses NetApp SnapManager for Microsoft Exchange Server to reduce backup times and back up data without taking systems or databases offline. The easy-to-use interfaces allow IT to provide other groups with self-service backup and restore options. "Our unified communications team oversees our Exchange environment, and they're able to do a lot of things on their own now," says Wood. "That streamlines operations and minimizes impact on other IT operations teams."

The Enterprise Storage team relies on NetApp OnCommand® System Manager and Operations Manager to manage and configure all the NetApp storage systems from a centralized management console. To manage NetApp storage volumes for its virtual machines directly from within VMware vCenter™, engineers use NetApp Virtual Storage Console for VMware vSphere®.

"The integration between NetApp and VMware is saving us a lot of time," says Wood. "And again, it allows us to offer self-service options to our VMware administrators, who can now perform virtual machine and file-level recoveries on their own."

Business Benefits

Lowering total cost of care

NetApp storage efficiency technologies are enabling Intermountain to improve ready access to critical patient information by keeping more data on disk, while reducing storage costs. As a result, the organization is enhancing care while lowering total costs—a goal of every healthcare organization.

"In key areas, deduplication and compression are saving us up to 60% of our total storage space on NetApp," says Franklin. "When you also factor in the benefits of thin provisioning across the enterprise, that translates to around 500TB of disk savings." At more than $6,000 per terabyte for high-performance SAN, Intermountain has saved almost $3 million in storage costs—and has also seen savings in the associated power, cooling, and data center space.

Despite 30% annual data growth, Intermountain has been able to manage its NetApp infrastructure with the same number of employees. "Intermountain has an initiative to provide healthcare coverage with rates rising no faster than the consumer price index plus 1%, while delivering improved care," says Franklin. "NetApp is helping us achieve this goal. Any organization that isn't taking advantage of storage efficiency technologies is missing a critical opportunity."

A scalable foundation for virtual desktops

As Intermountain expands its use of VDI, Franklin and his team can be confident that end users will have a positive experience, accelerating VDI acceptance and minimizing support calls. "With NetApp storage and Flash Pool on the back end, we now have a relatively compact storage VDI in place to support 6,000 to 8,000 users, with excellent scalability

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potential," says Wood. "Storage capability is the single largest risk factor when implementing VDI, and we are confident in the NetApp systems we have put in place."

Tier 1 performance and availability

Intermountain has moved more and more workloads over to NetApp based on the proven reliability of the storage and cost advantages. "NetApp plays a big part in our ability to deliver higher-quality care at a lower cost, offering tier 1 performance and availability, while helping us delay capital expenditures and contain operational costs. That's why almost two-thirds of our data now resides on NetApp."

Our solution partner:

vmware®

SOLUTION COMPONENTS

NetApp Products

NetApp FAS6280, FAS6240, FAS3270, FAS3250, and FAS3220 storage systems with Data ONTAP® operating in 7-Mode

NetApp OnCommand System Manager

NetApp OnCommand Unified Manager core

NetApp Virtual Storage Console for VMware vSphere

NetApp Snapshot and SnapRestore technologies

NetApp SnapManager for Microsoft Exchange Server

NetApp SnapMirror

NetApp SnapVault

NetApp Flash Cache

NetApp Flash Pool

NetApp deduplication, compression, and thin-provisioning

Environment

Applications: Microsoft Exchange Server 2010, Microsoft SharePoint 2010, Microsoft Office, clinical applications

Database: Microsoft SQL Server 2008

Image archive: Agfa and GE PACS

Network: Cisco Nexus® switches

SAN fabrics: Brocade and Cisco®

Server virtualization: VMware vSphere 5.0 and VMware vCenter

Desktop virtualization: VMware View 5.0

Protocols

FC-SAN

NFS

CIFS

Partner

Ciber
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