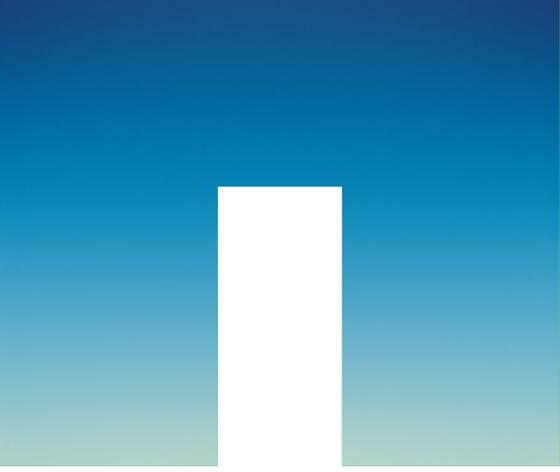


WHITE PAPER

Data Now: Improving Performance in Epic EHR Environments with Cloud-Connected Flash Technology



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Introduction

To ensure high-level performance, the Epic electronic medical record (EMR) system has stringent data management and storage requirements to accommodate the industry's rapidly expanding volume of clinical data and medical images. As data volumes explode, however, so do the challenges of securing, accessing, moving, and managing the information that is critical for effective diagnosis and treatment.

Historically, healthcare IT has suffered from isolated silos of data — a costly and inefficient approach, with each silo managed by separate applications and data storage infrastructure. Now, new data storage technologies are liberating data from its silos to accelerate application performance and future-proof investments. These technologies deliver the flexibility to scale capacity and efficiently manage data, whether it's stored in multiple locations, on the premises, or in secure cloud locations.

This white paper explores the following concepts as they relate to clinical data management:

- **Simplicity.** One data management platform allows IT to focus on the business rather than on the infrastructure and its maintenance.
- **Performance.** Faster data access means faster decisions, improving the clinicians' user experience, accelerating care, and driving business decisions.
- **Reliability.** Nondisruptive patient care operations can run with enterprise-class availability and protection.
- **Efficiency.** Institutions can improve efficiency by reducing rack space, power, and cooling requirements.
- **Agility.** Increase agility while unifying storage infrastructure.

This paper also presents real-world examples of NetApp healthcare customers who are using NetApp® flash storage for the Epic electronic health record (EHR) platform.

Modernization

Set a New Standard for Performance and Choice

In an era of exponential patient data growth, healthcare providers face the ongoing challenges of balancing performance and cost. New cloud-connected technologies provide the ultra-low latency required for clinical applications, including the Epic EHR platform, and they also deliver the freedom of choice to securely store and manage patient data in the most cost-effective environment, including public, private, and hybrid cloud.

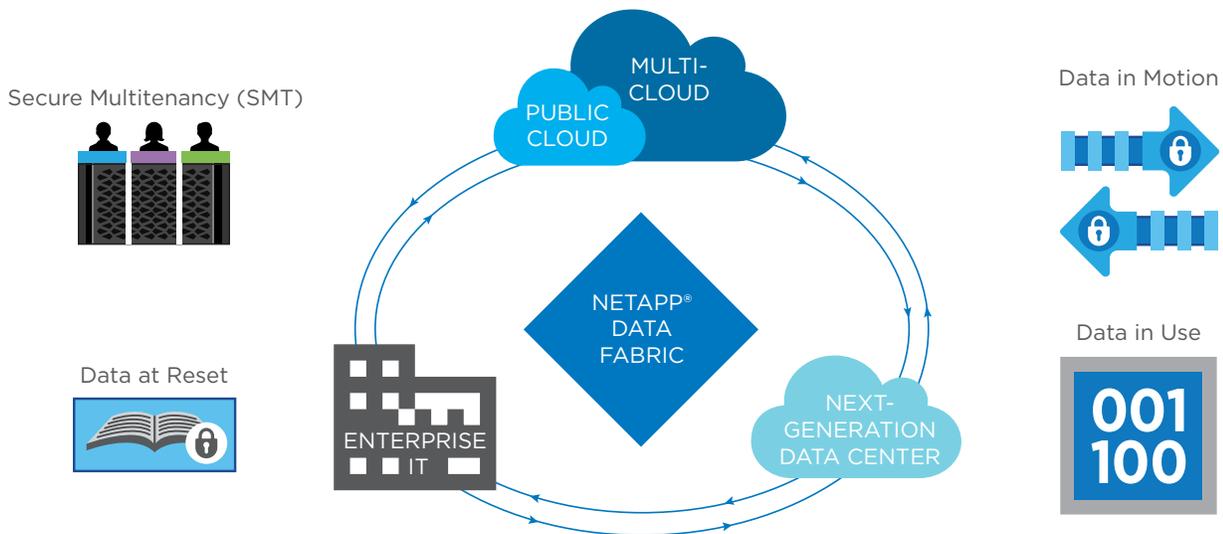
The NetApp Data Fabric strategy simplifies and integrates data management across storage environments, delivering a solution that is secure, efficient, and future-proof. With a single solution, large volumes of data can be securely stored and easily managed throughout the data's lifecycle, while maintaining regulatory compliance. The solution also makes it possible to easily move data to the institution's preferred environment, on the premises or in the cloud.

Streamline Medical Imaging Management

Existing storage infrastructures are challenged by the volume, size, and growing number of departments that create imaging objects. The NetApp Data Fabric enables cloud-based storage and management, so that organizations can embrace the cloud on their own terms by integrating on-premises enterprise-class data management and control with the flexibility, speed, and economies of the cloud. These NetApp solutions adhere to internal, HIPAA, and HITECH security policies and requirements while promoting innovation and IT responsiveness in medical image management.

Accelerate Innovation in Development Environments

In 2011, Tucson Medical Center (TMC) invested in data storage technology that was completely filled in a mere 3 months. Faced with rapidly growing data volumes from its core Epic software and retention of data per HIPAA guidelines, TMC turned to NetApp for its ONTAP® technology and FlexPod®



data center solution from NetApp and Cisco. With these technologies, TMC can spin up development environments in 20 minutes instead of 2 days. Additionally, TMC can reorganize storage structures without downtime or application latency, which improves clinician satisfaction and the patient experience, and boosts the quality of the outcome.

“Everything that we have, systems-wise, runs—and runs more resiliently—because of NetApp storage.”

—Drew Burnett, Systems and Network Manager, Tucson Medical Center

Simplicity

One Data Management Platform Moves the Focus from Infrastructure Maintenance to Business Management

The modern IT infrastructure reflects the need to improve speed and responsiveness to support critical business operations.

Flash arrays and cloud-connected technologies simplify infrastructure management to enhance business performance. Unfortunately, many all-flash array solutions on the market today lack robust data management, integrated data protection, and seamless scalability, as well as deep application and cloud integration. What's needed is a platform that shares the same consolidated infrastructure for workloads or tenants that have different performance, capacity, and security requirements.

Simplify Infrastructure to Realize the Most Benefits

The NetApp Data Fabric simplifies, automates, and evolves the movement and management of data. NetApp AFF systems help organizations meet their enterprise storage requirements with the industry's highest performance, superior flexibility, and best-in-class data management and cloud integration. Combined with the industry's first end-to-end NVMe technologies and NetApp ONTAP data management software, AFF systems accelerate, manage, and protect business-critical data. With an AFF system, organizations can make an easy and risk-free transition to flash for digital transformation.

- Gain a global view of storage with a single management console
- Eliminate planned and unplanned downtime for continuous business availability
- Perform updates during regular work hours without disrupting applications or users
- Scale capacity and performance without disruption

Eliminate Data Center Headaches and Focus on Business Needs

Renown Health is a locally governed and locally owned, not-for-profit integrated healthcare network that serves a 17-county region that includes northern Nevada, Lake Tahoe, and northeastern California. With space at a premium in its hospital-based data center, there was no room to expand its Epic platform. Renown needed an IT infrastructure that could resolve capacity, performance, accessibility, and resiliency issues while allowing the organization to seamlessly adopt new technologies.

Using NetApp AFF and SnapMirror® replication technology, Renown created two offsite data centers, enabling IT resources to be shared across the organization to accommodate future growth. As a result, Renown only has to manage one NetApp platform for both data centers, applications get the required performance level, and physicians and other healthcare professionals have access to the files that they need, when they need them, no matter where the files are. Replication between the two remote data centers provides the resiliency required to reduce downtime.

“It is critical to think outside the box. Being content with what you have can be dangerous. It is not very resilient. It is too rigid to allow change. It creates more limitations than opportunities.”

—Frank Abella, Director IT Infrastructure Operations, Renown Health

Performance

Faster Data Means Faster Decisions, Speeding Diagnosis and Care

Through a combination of on-premises and cloud solutions, organizations can seamlessly and easily manage data to deliver information and enable the insights that lead to better patient care.

To better understand usage trends for flash storage with Epic EMR software, Gatepoint Research surveyed more than 100 business and technical thought leaders in the healthcare

industry. Survey participants represented hospitals, health systems, and other healthcare institutions. The people who voluntarily responded were primarily IT senior decision makers, including 11% C-level executives, 14% vice presidents, 41% directors, and 34% managers.

When choosing a flash storage solution for Epic, respondents had considered several factors. Most considered the Epic comfort level rating, vendor reputation and stability, ease of implementation and use, and cost and speed to be of key importance. Second only to speed, 86% of respondents considered cost to be the most important factor when choosing a flash storage solution for Epic.

Increase the Performance of Epic Environments

NetApp offers an ideal storage platform for Epic software environments with unique capabilities to meet the stringent storage performance requirements of Epic applications and the Caché database. Using NetApp flash solutions in Epic environments is an excellent way to maintain submillisecond response times for demanding clinical workloads. These systems optimize I/O and maximize application throughput while running leading data management functions. The systems also meet the required SAN response times of <12ms average read latency, <1ms average write latency, and longest Caché write burst cycle time completion of <45 seconds, as defined by Epic for meeting application-level performance.

Organizations can modernize their data management and harness the power of the hybrid cloud with NetApp ONTAP, the industry's leading enterprise data management software. ONTAP combines new levels of simplicity and flexibility with powerful data management capabilities, storage efficiencies, and leading cloud integration. Each new version of ONTAP significantly increases performance. ONTAP 9.3 reduced latency more than 40% from version 9.1, and total input/output per second (IOPS) increased to 420,000 with version 9.3, versus 220,000 with version 9.1. By way of comparison, the largest Epic environment in the world has only 65,000 IOPS.

To increase performance, the NetApp AFF A-Series combines low-latency NVMe solid-state drives (SSDs) and the first NVMe over Fibre Channel (NVMe/FC) connectivity. The AFF A800 delivers less than 200µs latency and a massive throughput of up to 300GB/s in a 24-node cluster. As the industry's first all-flash arrays to provide both 100GbE and 32Gb FC connectivity together, the A-Series systems also support the NVMe/FC host connection, enabling customers to run 60% more workloads or cut the application response time by half.

Accelerate Adoption of Standardized Care

As the technology backbone of Mercy, the fifth-largest Catholic health system in the United States, Mercy Technology Services (MTS) supports a network of more than 3,500 physicians and 65,000 healthcare technology users nationwide. Its pioneering Epic EHR software-as-a-service (SaaS) offering is used by hospitals throughout the country.

Built on FlexPod and NetApp ONTAP, the Mercy Epic EHR service offering with AFF delivers the required performance and high comfort level for Epic EHR, fueling the analytics that help physicians identify trends and make critical decisions.

Overnight queries and reports that used to run well into the morning can now be in physicians' hands hours sooner, as they arrive for their shifts. And healthcare providers can leverage big data analytics to identify best practices and eliminate inefficiencies.

“When we use data to standardize treatment, patients consistently get the very best care. Rather than rely solely on their own experience, physicians are now able to draw on the experience of thousands of physicians to standardize on data-proven care.”

—Gil Hoffman, MTS Senior Vice President and Chief Information Officer

Reliability

Nondisruptive Patient Care Operations Run with Enterprise-Class Availability and Protection

Healthcare organizations demand reliable data to make decisions that drive the business, as well as decisions that affect patients' lives. Minimizing downtime is an important concern in decision making. With flash storage, organizations can easily avoid downtime by moving the live production database, if necessary, so that physicians have constant access to the EHR.

Strong Epic Relationship

Since 2010, Epic and NetApp have maintained a technical alliance to consistently test and ensure that NetApp storage systems meet all Epic customer requirements. Today, many of

Epic's largest and most progressive customers run their Epic production, operational, and analytical databases on NetApp.

NetApp FAS initially earned Epic's High Comfort Level ranking for midrange arrays in 2013, and for enterprise arrays in 2014. In June 2015, NetApp AFF became the first new all-flash array to receive Epic's High Comfort Level, receiving the ranking for both enterprise and midrange environments.

Reliable Data Delivered to Physicians

Sentara Healthcare, a 12-hospital HIMSS Davies award-winning health system in Virginia, has run its Epic Caché and Clarity production databases on flash-accelerated NetApp storage since 2012.

“In architecting our Epic electronic medical records system, we knew it was essential to implement high-availability storage. Any downtime, even for upgrades, disrupts medical staff and compromises their ability to deliver responsive, high-quality care.”

—Joseph Rowell, Manager of Enterprise Architect Solutions, Sentara Healthcare

Efficiency

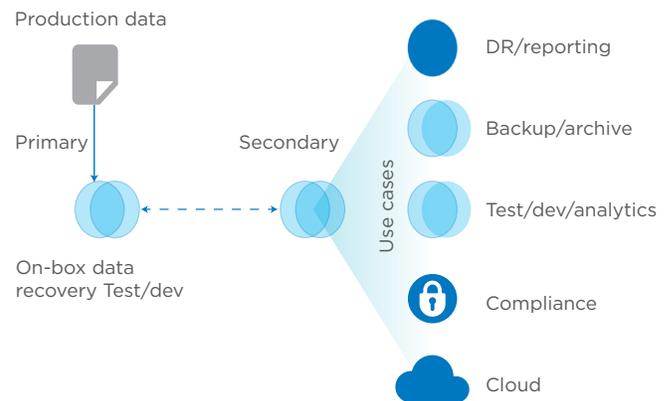
Reduce Costs by Reducing Rack Space, Power, and Cooling Requirements

Healthcare organizations realize substantial benefits by increasing the efficiency of their IT operations to transform data center economics. By leveraging best-in-class flash technology and cloud integration approaches, organizations can boost efficiency by moving data and applications to where they run best—either on the premises or in the cloud. With these approaches, organizations have been able to:

- Reduce power use by 15 times, rack space by 37 times, and support costs by 67%.
- Set up and configure a complete system and serve data within 10 minutes.
- Upgrade to a modern NVMe-based SAN infrastructure with a simple software upgrade to support 60% more workloads or to cut application response time in half, without disruption.

Efficient data replication strategies also help organizations leverage their data. Whether the replicated data is used for disaster recovery or backup and archive, efficient storage approaches greatly reduce unplanned downtime. In addition, most organizations struggle with providing replicated data stores in a timely manner to meet analytics and reporting needs without increasing the workload demands on production environments. With efficient data replication, organizations can increase the value of their secondary data to improve care quality and outcomes in an environment that is placing an increased emphasis on value-based care.

Increase the Value of Secondary Data



Efficient, Unified Storage

Designed specifically for flash, NetApp AFF A-Series all-flash systems deliver industry-leading performance, capacity density, scalability, security, and network connectivity in dense form factors. With the addition of the new NVMe-based AFF A800, the A-Series family extends enterprise-grade flash to AI and to machine learning. NetApp provides efficient, unified storage with built-in data protection across systems:

- NetApp AFF and FAS
- NetApp ONTAP Select
- NetApp ONTAP Cloud

Efficiently Deploy Epic Solutions

University Medical Center New Orleans, the academic medical center of LCMC Health, turned to NetApp to modernize the delivery of its Epic EMR through its own data centers. LCMC deployed FlexPod Datacenter with NetApp AFF to host its Epic EMR and 3,000 virtual desktops. The efficiency of the solution enabled LCMC Health to reduce Epic deployment time by 80%. In addition to the performance benefits, the FlexPod with AFF solution gave the LCMC IT team improved flexibility.

“One of the most important things for us is to be able to quickly make adjustments to the architecture, and we have a lot of requests to make a copy of our production database. This process, which used to take us anywhere from 8 hours to 16 hours to accomplish, now takes less than 20 minutes.”

—Austin Park, Epic Infrastructure Team Leader, LCMC Health

Agility

As the affordability of flash-based storage solutions improves, it's easier for healthcare institutions to modernize IT, including cloud-connected flash technology. Faster, smaller, and more flexible flash arrays deliver ultra-low latency to run clinical applications with unprecedented speed and efficiency. Cloud-connected flash dramatically improves data center economics, enabling institutions to store and manage data in their preferred environments, including public, private, and hybrid cloud in addition to on the premises.

Increasing Agility Through Unified Storage Infrastructure

With cloud-connected flash technology, application-based silos of single-purpose storage arrays can be replaced with a common data management platform for EMR, imaging, analytics, genomics, and enterprise workloads. Additionally, these storage resources can be expanded quickly as needs dictate.

Data can reside on the premises, in secure public or private clouds, or in a hybrid environment.

“Cloud-connected flash technology is creating an environment where IT can be getting answers to their queries before traditional deployments could even get approved. This unprecedented agility is helping organizations innovate, accelerate new services, and create a modern IT architecture.”

—Joseph Hobbs, CHCIO, Strategic Partner Manager
Epic, NetApp Healthcare

Conclusion

NetApp flash solutions for Epic environments deliver consistent high performance, availability, and data protection. Since 2010, Epic and NetApp have maintained a technical alliance to test and confirm that NetApp storage systems meet Epic customer requirements. A growing number of Epic's largest and most progressive customers run their Epic production, operational, and analytical databases on NetApp technology.

NetApp cloud-connected solutions are designed to support an organization's journey to higher-quality patient care and to more cost-effective IT solutions and services. The NetApp Data Fabric strategy gives healthcare organizations a path forward to greater control, agility, and cost efficiency. A combination of on-premises and cloud solutions makes it possible to seamlessly and easily secure, store, manage, and move data, delivering information and enabling the insights that lead to better patient care.

For more information, send us email at Epic@netapp.com.

About NetApp

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