

Solution Brief

Accelerate Performance and Simplify Infrastructure with the Proven NetApp Flash Solution for Epic

Key Benefits

Increased Performance

Deliver sub-1-millisecond average read and write latencies and sustained high IOPS for Epic Caché and Clarity/Cogito database performance with the industry's most advanced all-flash array.

Improved Business Agility and Efficiency

Quickly respond to changing business needs by cloning your Caché replication environments while reducing the cost of your storage and server infrastructure.

Increased Availability and Data Protection

Experience nondisruptive operations and enterprise-caliber high availability while streamlining backup, recovery, replication provisioning, and disaster recovery in a modern clustered architecture.

Streamlined Operations

Unify all tiers of storage—including SAN, NAS, flash, hybrid, encryption, backup, and the cloud—into an integrated Epic enterprise storage platform to eliminate silos of storage products. Manage data growth with a scale-out and scale-up clustered environment managed by the NetApp® ONTAP® storage operating system.

Proven NetApp Validated Architecture for Epic Environments

NetApp solutions for Epic environments deliver consistent high performance, availability, and data protection. Together, the NetApp and Epic solutions reduce IT and business costs and complexity, accelerating Epic application performance while improving agility with robust enterprise data management capabilities.

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 fabric-attached-storage (FAS) initially earned Epic's High Comfort Level ranking for midrange arrays in 2013, and for enterprise arrays in 2014. In June 2015, NetApp All Flash FAS became the first all-flash array to receive Epic's High Comfort Level, receiving the ranking for enterprise as well as midrange environments.

Please see the current quarterly version of Epic's *Storage Products and Technology Status* document for the latest comfort rankings and additional guidance on array considerations.

“In architecting our Epic electronic medical records system, we knew it was essential to implement high-availability storage,” said Joseph Rowell, manager of Enterprise Architect Solutions, Sentara Healthcare. “Any downtime, even for upgrades, disrupts medical staff and compromises their ability to deliver responsive, quality care.”

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.

Scale-Out Architecture

NetApp storage solutions, powered by the ONTAP storage operating system, deliver the advanced storage control needed for mission-critical workloads. Scaling occurs nondisruptively without maintenance windows or the challenge of coordinating downtime across teams. This benefit makes it easy to add shelves of SSDs or nodes to expand the storage infrastructure to meet growing data volumes, with performance optimized for specific workloads.

NetApp provides 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, including:

- **Optimized for random reads.** NetApp flash uses intelligent caching to accelerate the random reads of the Epic user workload.
- **Optimized for writes.** NetApp's patented WAFL® (Write Anywhere File Layout) system is paired with nonvolatile random access memory aggregates and optimizes Caché 80-second write burst cycles.

- **Protects against disk failures.** NetApp RAID DP® technology provides superior protection against disk failures compared to that of single-parity RAID, without the performance penalties of RAID 5 or RAID 6 or the overhead cost of RAID 10.
- **Efficient in supporting exponential patient data growth.** NetApp remains the industry leader in delivering storage efficiency with the optimal use of compression, deduplication, thin provisioning, and virtual cloning. Epic customers use NetApp FlexClone® software technology to save upward of 60% of the disk space needed for the required replications of the Caché database.
- **Provides proven high availability.** NetApp systems are extensively engineered to deliver nondisruptive operations for tier 1 SAN mission-critical environments and meet all Epic high-performance and high-availability requirements. IDC analyzed NetApp AutoSupport® data from over 29,000 installed NetApp FAS controllers and confirmed that these systems had met or exceeded six-9s (99.9999%) availability in the past year.*
- **Enhances backup and restore processes.** NetApp Snapshot® copies and NetApp SnapMirror® technology augment the shadow copy and nightly backups to clones. Doing so provides the capability to automate moving copies to secondary arrays and secondary data centers to provide fast incremental restores from disk as part of a DR restoration process.
- **Simplifies Epic storage management.** The comprehensive, highly integrated ONTAP toolset delivers ease of administration and efficiency in supporting multiple replications, backups, and disaster recovery.

NetApp Flash Storage Portfolio

NetApp flash technology accelerates Epic application performance and end-user response times while delivering greater efficiency and data center rack density.

NetApp flash solutions deliver:

- Predictable high performance for flash
- Integrated flash-optimized architecture
- Integrated Data Protection across flash, disk, and the cloud
- Integrated asynchronous and synchronous replication options
- Integrated nondisruptive operations, including seamless scale-out

NetApp OnCommand® Unified Manager (OCUM) and OnCommand Performance Manager (OCPM), included with ONTAP, automatically monitor and analyze capacity and performance to simplify management for NetApp FAS and All Flash FAS systems. By using built-in system, dynamic, and user-defined policy thresholds, OCUM and OCPM detect and alert on capacity and performance incidents before they occur.

NetApp All Flash FAS

NetApp All Flash FAS is a robust scale-out platform built for virtualized environments. The platform combines low-latency performance with best-in-class data management, built-in efficiencies, Integrated Data Protection, multiprotocol support, and nondisruptive operations. The All Flash FAS system delivers 4 to 12 times higher IOPS and 20 times faster response for

databases than traditional HDD systems. All Flash FAS can be deployed as a stand-alone system or as a high-performance tier in a clustered ONTAP configuration.

“We’re providing an excellent working environment for physicians, clinicians, and radiologists, making it easier for them to deliver responsive patient care,” says Jason Kennedy, senior consultant for LCMC Health. “Our caregivers don’t always know that NetApp All Flash FAS is the reason they’re getting such rapid access to patient data. However, they’ve told us that our solution outperforms any clinical environment they have experienced.”

LCMC Health includes University Medical Center and Louisiana Children’s Medical Center among its five hospitals in the greater New Orleans area. LCMC migrated their Epic environment to NetApp All Flash FAS in 2016.

Low-Latency Performance

Including NetApp flash solutions in Epic environments is an excellent way to maintain sub-1-millisecond 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.

Security

Provision consistent data security policies across flash, disk, and the cloud—with visibility and control that span your entire data infrastructure.

In partnership with other security industry leaders, NetApp delivers a portfolio of solutions that help support your multipronged approach to data security, including:

- NetApp Storage Encryption provides transparent data-at-rest hardware-based encryption without diminishing storage efficiency capabilities such as deduplication and compression.
- Encryption key management provides Key Management Interoperability Protocol (KMIP)–compliant centralized management of all your encryption keys.
- Secure multi-tenancy in ONTAP software uses secure virtual partitions to share the physical storage environment among multiple distinct tenants.
- Nonreturnable disk support option can ensure that drives never leave your organization’s physical control.
- Integrated antivirus scanning protects corporate data from malware attacks and computer viruses.

NetApp maintains advanced security certifications for its platforms, including:

- Common Criteria EAL 2+
- FIPS 140-2 Level 2
- KMIP

- FIPS mode for management protocols
- File-Based Event Notification
- Third Party Erasure Verification
- DoD UC APL

NetApp and our ecosystem of integrated data security partners enhance your ability to protect your valuable patient data at rest and in flight. We do so with proven, safe technologies and encryption choices aligned with your IT security strategy.

State-of-the-Art Data Protection

NetApp Integrated Data Protection is a core component of ONTAP. This feature provides availability, backup, compliance, and disaster recovery services right from the storage platform. NetApp storage efficiency technologies and techniques are designed to reduce unchecked storage growth. These technologies include deduplication, compression, thin provisioning, and thin replication. They help lower costs and accelerate business performance, making it possible to store, replicate, and recover data faster while storing more backups longer.

Cost Effectiveness

NetApp All Flash FAS for Epic environments reduces physical space requirements and the costs associated with overprovisioning. By eliminating disk drives that are not needed for storage capacity, healthcare providers can reduce the purchase price of a storage system and can obtain ongoing savings by consuming less power, cooling, and rack space.

Snapshot Copies

NetApp Snapshot technology protects data—from a single file to a complete disaster recovery solution—by creating point-in-time copies of file systems. NetApp Snapshot can be used while applications are running without a performance penalty, creating Snapshot copies in less than a second, regardless of volume, LUN size, or level of activity on the NetApp system.

NetApp FlexClone Volumes

A challenging reality of the Epic environment is the need to provision and manage six or more replications of the Caché database for support (SUP), release testing (REL), release validation (REL VAL), training, test, and other requirements. Some customers have over 30 copies, whether full or squashed, that they must provision, manage, and refresh daily or weekly or on an ad-hoc basis.

Traditional storage arrays have been limited to providing these replications through full, straight-line copy management. NetApp was the first storage vendor to enable Epic customers to provision them as readable/writable clones using NetApp's patented FlexClone software technology. FlexClone volumes enable Snapshot based replication copies to be provisioned from a full golden copy, typically on the reporting disk pool. FlexClone volumes use up to 80% less physical disk yet provide full functionality for the users of these environments.

As an example of increased agility, FlexClone volumes can be provisioned in minutes rather than hours or days, without the need to have extensive TBs of additional storage available.

- Get increased agility for advanced analytics as an Accountable Care Organization and for population health management. Have more rapid automated provisioning of new environments with FlexClone volumes and orchestration with NetApp OnCommand Workflow Automation (WFA).

Automated Workflows

NetApp OnCommand WorkFlow Automation is a powerful and flexible tool to orchestrate environment refreshes. Included with ONTAP, WFA provides an alternative to the traditional extensive, complex scripting required for provisioning and refreshing replication environments.

NetApp developed a prebuilt WFA for Epic solution to accelerate the Epic refresh processes. By leveraging existing Epic scripts, the WFA toolset orchestrates environment refreshes for SUP, REL, and REL VAL. The toolset utilizes FlexClone volumes in a predictable, automated manner to speed up the process, compress cycle times, and improve storage efficiency. Users of the WFA for Epic solution have documented reducing the duration of refreshes of their SUP environments from 16 to 24 hours with previous storage vendors to as little as 14 minutes with NetApp.

UNIX Server Platforms

NetApp maintains regular interoperability and performance testing with the IBM Power AIX and Intel/VMware ESXi/Red Hat Enterprise Linux target server platforms. Both platforms are fully supported by NetApp and guidance for both the IBM Power AIX and virtualized RHEL platforms are provided in the series of published Epic on NetApp technical reports.

Converged Infrastructure for Virtualized Intel/ESXi/RHEL Target Platform

Epic Software on FlexPod

To reduce implementation time, deliver predictable high performance, and increase supportability, Epic customers increasingly consider converged infrastructure options. FlexPod®, a prevalidated, rigorously tested converged infrastructure from the strategic partnership of industry leaders Cisco, NetApp, and VMware, is engineered and designed specifically for delivering predictable low-latency system performance and high availability. The FlexPod solution consists of Cisco UCS servers, Nexus switches and fabric interconnects, NetApp All Flash FAS, and VMware ESXi. The solution meets Epic system requirements with a modular, virtualized, efficient, scalable, and cost-effective platform. See the "FlexPod Datacenter with Epic" technical report, TR-4389, for additional details.

"A partner like NetApp, who understands the critical availability needs that an EMR system requires, really helped us to gain the trust of our customer base," says Scott Richert, VP of Enterprise Services, Mercy Technology Services. "The tools SnapMirror, SnapVault, and FlexClone volumes have changed the

lives of the folks that operate our storage systems. They've allowed us to reduce our backup times. We now get them done in less than an hour. Our operational costs have reduced significantly."

Mercy operates 34 hospitals across 5 states and is one of Epic's largest installed customers. Mercy has run its Epic Caché and Clarity production databases on flash-accelerated NetApp storage since 2013.

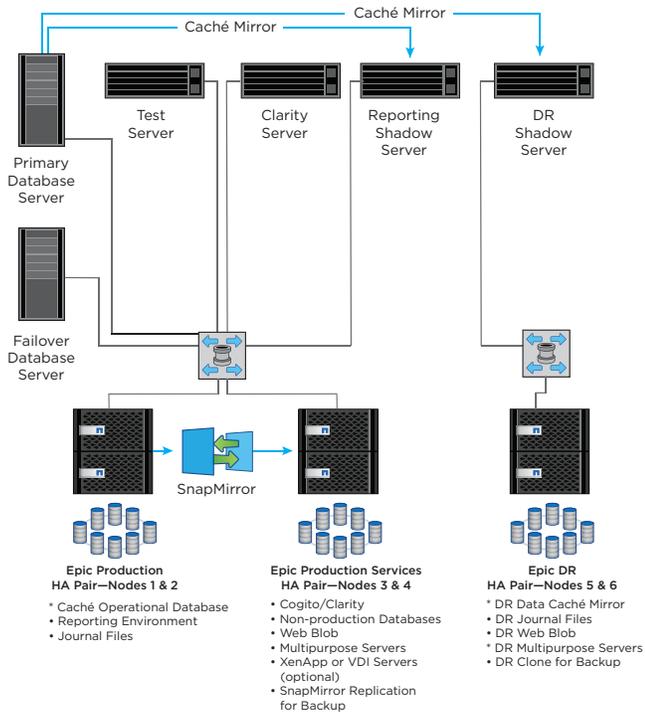


Figure 1) Epic on NetApp six-node reference architecture

Why NetApp?

Today's leading healthcare provider and payer organizations rely on NetApp to help store growing patient data and medical images reliably, efficiently, and affordably. NetApp helps you to deliver high-quality patient care by providing powerful, integrated hardware and software solutions that enable fast, cost-effective, scalable storage. With an efficient and a flexible storage infrastructure, healthcare organizations do not have to choose between saving money and improving business responsiveness.

Healthcare organizations can buy and implement Epic on NetApp solutions with confidence, knowing that these precisely architected solutions deliver a high-performance storage platform that exceeds Epic's published SAN read and write latency requirements. At the same time, the solutions improve flexibility and achieve cost and operational efficiencies.

- Modular, clustered architecture. Eliminates silos of disparate storage arrays.
- Unified storage infrastructure. Includes SAN and NAS requirements, flash and hybrid, backup, disaster recovery, and support for moving some portions to the cloud.
- High availability. IDC audited NetApp AutoSupport statistics and validated NetApp achieving six-9s availability across the NetApp installed-systems base.¹
- NetApp is the #1 storage provider to the U.S. federal government.²
- Twenty years of award-winning innovative efficiency technologies, including deduplication and compression, space-saving replication with FlexClone, and point-in time copies secure data without performance impact.
- NetApp is today the #2 provider of data storage worldwide.³

Improved Return on Investment

Working together, NetApp and Epic make it possible for mutual customers to expertly manage hundreds of terabytes of patient data, delivering high availability, data protection, and disaster recovery capabilities. NetApp offers fast, simple, scalable, and reliable data storage. Epic customers get a cost-effective, easy-to-maintain data storage solution that lowers their total cost of ownership while simplifying operational management.

"Rather than deploying yet another solution from another vendor, we saw the value in standardizing on a single, agile storage infrastructure that could support our expanded Epic software installation," said David Stark, chief technology officer, Group Health Cooperative of South Central Wisconsin. "We've recovered 25% of our data center space with expectations for that to reach 40% when we've completed consolidation. We've eliminated IT silos and are benefiting from centralized resource management."

Group Health Cooperative of South Central Wisconsin is a nonprofit health plan serving the greater Madison, Wisconsin, area, providing both insurance and clinical care services. Group Health Cooperative has run its Epic Caché and Clarity production databases on flash-accelerated NetApp storage since 2013.

1. Source: IDC Enterprise Storage: "The Foundation for Application and Enterprise Availability," September 2014.
 2. Federal agencies must report all contracts valued at \$3,000 or more. Based on FPDS-NG reports FY 2009-2011, NetApp is the top storage provider.
 3. IDC Enterprise Storage: "The Foundation for Application and Enterprise Availability," September 2014.

About NetApp

Leading organizations worldwide count on NetApp for software, systems and services to manage and store their data. Customers value our teamwork, expertise and passion for helping them succeed now and into the future.

www.netapp.com