Success Story

Carilion Clinic Elevates Patient Care with EMR System on NetApp

Customer Profile
Based in Roanoke, Virginia, Carilion Clinic serves a population of nearly 1 million residents in 23 western-Virginia counties through its 8 hospitals and over 100 ambulatory-care sites. The clinic has nearly 12,000 employees including 600 physicians covering more than 60 specialties. The not-for-profit healthcare organization is committed to improving outcomes for every patient while advancing the quality of care through medical education and research and strategic partnerships with Virginia Tech and other organizations.

The Challenge
Leveraging technology to advance patient care
The Carilion Clinic is known for its dedication to maintaining the highest standards of quality care. The healthcare organization is also a recognized leader in the application of information technology to change and improve the delivery of care to its patients. Identified by Hospitals & Health Networks in 2011, 2010, and 2009 as one of the “100 Most Wired” health systems in the United States, Carilion is practiced at leveraging technology to enhance business processes, customer service, and, most importantly, patient care.

Previously, Carilion used a standalone EMR system in its ambulatory practice and with multiple clinical application vendors across its hospitals. The company followed a best-in-class approach to assembling health records, which involved deploying individual systems for different specialties, such as imaging, cardiology, and orthopedics, on a mix of storage systems. The back-end integration grew cumbersome, especially as big data content such as imaging files, monitoring-device data, and clinical patient data continued to grow exponentially.

“We had a complex web of interfaces to manage on the back end, which required considerable IT staff time,” says Kendall White, senior IT director at Carilion Clinic. “It was time to move beyond disparate sources of information feeding into our infrastructure to one longitudinal medical record and a streamlined approach to managing our EMR system and patient data management challenges.”

KEY HIGHLIGHTS

Industry
Healthcare

The Challenge
Resolve the patient care and IT complexities resulting from standalone EMR solutions and disparate storage systems.

The Solution
Deliver a high-availability, high-performance foundation for EpicCare® EMR on NetApp® storage systems.

Benefits
- Provided an integrated, end-to-end storage platform for the EpicCare EMR system
- Enabled multiple levels of data protection with unprecedented speed in backup and recovery
- Reduced data center footprint and power and cooling costs by driving efficiency in storage infrastructure and operations, freeing up IT staff for other care-support tasks
“With EpicCare EMR on the unified NetApp storage platform, we’re delivering a tightly integrated system, which enhances our ability to provide a higher level of care across Carilion practices. We simply couldn’t accomplish this without the reliability, performance, and high availability offered by NetApp.”

Kendall White
Senior IT Director, Carilion Clinic

To gain the important benefits of adopting an integrated EMR platform—including standardized delivery of medical records, reduced errors, improved patient safety, streamlined reporting, quicker reimbursements, and decreased costs—Carilion needed to make the transition to a unified, centralized platform. The company selected EpicCare EMR from Epic Systems, known as a physician-friendly system that is in use by providers representing more than 100 specialties. Carilion understood the importance of leveraging a solid storage solution for Epic, to mitigate risk and optimize the performance of the EMR solution.

The Solution
A high-availability, high-performance foundation for EpicCare EMR

Carilion selected NetApp storage to serve as the foundation for its integrated Epic system and deliver anytime, anywhere access to patient data. Coordinated through an IT consulting services engagement, Carilion deployed a NetApp FAS6080 SAN storage cluster in its primary data center, with a V3140 open storage controller cluster and a FAS3140 storage cluster for the NAS environment. A FAS6030 storage cluster supports the disaster recovery site.

The IT organization also leverages NetApp multiprotocol support for its Fibre Channel, iSCSI, CIFS, and NFS connectivity needs.

Storage managers from the Carilion Clinic Technology Services Group (TSG) centrally manage the NetApp unified platform using NetApp Data ONTAP®, OnCommand™ Operations Manager, and Systems Manager technologies. “One of the most important things that NetApp brings to the table for us day in and day out is the ability to manage our entire mission-critical Epic® platform from a single console,” says White. Seamless integration between NetApp and Epic helps streamline management of the system and optimize performance.

The NetApp unified operating system, Data ONTAP 8.0, helps address the big data challenges by allowing TSG to utilize 64-bit aggregates to store entire databases on a single aggregate. This simplifies database management and reduces IT management costs. Additional efficiencies are gained in Windows Server® environments through using NetApp deduplication in areas such as server virtualization and home directories.

NetApp offers Carilion advanced backup, recovery, and disaster recovery capabilities that protect vital patient data and help enable its ongoing availability to physicians, nurses, and other staff members who depend on it 24/7. Using NetApp SnapMirror® technology in combination with Epic’s Shadow Reporting and Supports Read Only (SRO) failover functionality, the IT team is able to replicate data every four hours to two off-site locations for disaster recovery purposes.

TSG uses NetApp FlexClone® technology to clone Epic production environments for secondary backup to tape for the eight required replications of the Epic Cache database. It also uses it to perform software upgrades with minimal downtime. In addition, NetApp RAID-DP® technology enables the company to leverage fewer disks to meet IOPS and capacity requirements and protect its data against double disk failure.

Business Benefits
Seamless integration between NetApp and Epic

Besides protecting its valuable patient data, Carilion maintains a high-performance infrastructure to provide 24/7 access to the EpicCare system. Carilion also leverages the
seamless integration between the EpicCare and NetApp storage systems to support its high-availability, high-performance needs.

"With EpicCare EMR on the unified NetApp storage platform, we’re delivering a tightly integrated system, which has enhanced our ability to provide a higher level of care across Carilion practices," says White. “We simply couldn’t accomplish this without the reliability, performance, and high availability offered by NetApp.”

The high-bandwidth, highly scalable design of the NetApp FAS6000 series enterprise storage systems supports the big data application demands of Carilion’s EpicCare system. According to White, the FAS60080 readily handles the 7,000 IOPS and peaks of 1,200,000 global references per second generated from the Epic Cache production database.

Carilion optimizes performance of its NetApp storage using the intelligent caching from NetApp Flash Cache, which helps deliver the required low average read latencies by prioritizing critical workloads for fast response. “NetApp Virtual Storage Tier with Flash Cache provides significant performance improvements on our FAS6000 series systems,” says Mahesh Tailor, manager of Technical Services at Carilion.

By deploying EpicCare on NetApp storage, Carilion provides ongoing availability of patient records to 8,000 staff members with Epic access. Day to day, the system supports more than 3,200 concurrent users at peak times, with capacity to support additional growth. Users include all staff members with clinical roles, such as physicians, nurses, physical therapists, billing specialists, patients, and others. NetApp supports the daily delivery of patient care plans, patient invoices, prescriptions, and all other information necessary to providing high-quality, integrated, comprehensive patient care.

Highly redundant, fully recoverable patient data

With the combined disaster recovery capabilities of NetApp and Epic, Carilion provides round-the-clock availability of critical patient data, while the IT team benefits from the efficiency of NetApp disaster recovery solutions. “With NetApp storage, our TSG team can meet the tight 1-minute recovery point and 15-minute recovery time objectives of our stringent service-level agreements, which translates to consistently available patient data for our entire staff,” says Tailor.

Replication is imperative for effective use of the Epic system, given the need to regularly create many copies of the Epic production environment for data protection, testing, upgrades, or other IT activities. Carilion replicates all Epic data every four hours from its primary data center to its secondary site using NetApp SnapMirror. “NetApp helps ensure that our entire Epic system is highly redundant and fully recoverable at a moment’s notice,” says Tailor. With Epic on the FAS6000 series storage systems, TSG can back up Epic application data in seconds and recover it in just minutes using Snapshot™ and SnapRestore™ technologies.

**Storage efficiency with the scalability for growth**

In addition to disaster recovery efficiencies, NetApp storage offers IT management and hardware efficiencies that help reduce Carilion storage requirements and IT costs while improving the end-user experience. Overall, NetApp storage efficiency and performance, which accommodate even the most data-intensive workloads, have allowed Carilion Clinic to remove much of the infrastructure previously required to support the production environment.

The clinic has reduced its storage footprint and power and cooling costs by replacing 25 Fibre Channel disk shelves with 6 SAS shelves. NetApp FAS6000 series scalability enables the clinic to easily add storage when necessary.
“With NetApp storage, our Technical Services Group team can meet the tight 1-minute recovery point and 15-minute recovery time objectives of our stringent service-level agreements, which translates to consistently available patient data for our entire staff.”

Mahesh Tailor
Manager of Technical Services, Carilion Clinic

needed as Epic data increases. Most important, with an integrated, streamlined EpicCare environment, the Carilion staff has a centralized, real-time view of patient data and the ability to deliver advanced patient care and an enhanced patient experience.

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