

**Carilion Clinic** found that incrementally upgrading its multi-vendor storage infrastructure resulted in higher costs, greater complexity and reduced reliability. By standardizing on all-flash arrays from Pure Storage, southwest Virginia's largest healthcare provider has seen significant improvements in performance and availability, as well as a sharp reduction in storage-management requirements and cost.

**BUSINESS TRANSFORMATION**

Physicians and other patient-facing staff have faster access to the files and applications they require for their work. The space and operating costs devoted to storage have been cut in half. Storage-related tasks have been significantly reduced, freeing up cycles for new projects.

**GEO**

North America

**INDUSTRY**

Healthcare

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Daniel Persico,  
*Manager, Systems Operations*

**CARILION CLINIC GAINS A HEALTHY OUTLOOK FOR THE FUTURE BY STANDARDIZING ON PURE STORAGE**

Carilion Clinic is the largest healthcare provider in southwest Virginia, serving nearly one million people through a network of seven hospitals, more than 150 clinic sites, and affiliations with the Jefferson College of Health Sciences and Virginia Tech. Its IT infrastructure touches nearly 13,000 employees, plus another 3,000 personnel at partner organizations in the region.

“Our patients are at the core of everything Carilion does, and we’ve built our IT infrastructure accordingly,” noted Daniel Persico, Manager of Systems Operations. “As the largest healthcare provider in southwest Virginia, our IT infrastructure also supports numerous community organizations.” Carilion operates multiple data centers in southwest Virginia, and uses more than 1,500 servers, some 900 of which are virtualized. At the core of its IT operation is the Epic electronic health record (EHR) suite of applications. Administrative and other clinical information is stored on Oracle and SQL Server databases.

After almost two decades of experience in enterprise IT, Persico knew how legacy storage vendors worked, and he was becoming frustrated. “In general, we were satisfied with the performance of our legacy storage, but we found that with the arrival of any new feature — like de-duplication or compression — it added complexity and cost. Every feature was a new line item that added cost, added code, and led to a less stable environment, because adding those features would usually require downtime. I just felt we were getting nickel-and-dimed at every turn.”

When the maintenance contract for Carilion’s legacy SAN came up for renewal, the IT team decided it was time for a fresh look at storage. “Initially we thought of adding some flash storage to the front end to speed up our EHR applications, but the storage vendor’s response every time was to add a piece of code here and a piece of code there. That just added to the complexity, and it caused downtime that we just couldn’t accept. So, we looked at other vendors.”

**THE SEARCH FOR A NEW SOLUTION LEADS TO PURE STORAGE**

With its Epic EHR system due for an upgrade at the end of 2016, the Carilion team wanted a new storage solution in place before that latest release. “We set an aggressive timeline, so we didn’t do a POC,” Persico recalled, “but we did have very intensive discussions with three suppliers,” including Pure Storage.

**COMPANY:**

Carilion Clinic  
[www.carilionclinic.org](http://www.carilionclinic.org)

**USE CASE:**

- Electronic health records – Epic®
- Database – InterSystems® Cache, Microsoft® SQL Server, Oracle®

**CHALLENGES:**

- Legacy storage was becoming ever-more complex and unstable.
- The addition of even minor new features required downtime, as well as incremental cost.

**IT TRANSFORMATION:**

- Consistent sub-millisecond latencies improve end-user response times for key applications.
- Effortless management removes routine storage tasks from IT staff.
- Data-reduction rates of as much as 15:1 drastically reduce space and power requirements.

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Daniel Persico,  
 Manager, Systems Operations

After evaluating the three alternatives against a long list of criteria, Pure Storage and one other supplier were selected as finalists. “So, the entire team met and held a secret ballot. Pure was the unanimous winner; it’s the first time we’d ever had a unanimous vote on any matter.”

What swung the decision in favor of Pure Storage was “the strength of the team, the demos they ran, and the feeling that we wanted to move to a faster, more modern platform. In addition, the expertise of Pure Storage in Epic proved to be a tipping point.”

An episode during the selection process highlighted one of the major differences between Pure Storage and its competitors. “One of the vendors was very proud that in their proposal they included \$70,000 worth of training. But while we appreciated the gesture, it sounded like a pretty complex system if you need two weeks of training on it.

“Soon after, we asked Pure Storage about the training element in their proposal. And their response was, ‘we have 20 minutes; would you like to do it now?’ But all kidding aside, it really wasn’t much more complex than that to get it up and running.”

He recalled that “one of the problems we had with legacy storage providers was the complexity. With Pure Storage, there’s no unnecessary overhead.”

**PERFORMANCE IMPROVEMENTS SEEN THROUGHOUT THE ORGANIZATION**

Within a few months of the decision to purchase Pure Storage, Carilion had 12 Pure arrays installed — eight FlashArray//M50s and four FlashArray//M20s. The first workloads installed on the Pure arrays were the Epic EHR applications, followed by several Unix applications, almost 900 virtual servers, and the SQL Server and Oracle databases.

The Epic application replicates a copy of the database to a second array, facilitating the process of making copies used throughout the organization. All copies are replicated to a secondary site in the event of a disaster or corruption of the application.

The installation of the Pure Storage arrays made an immediate impact on the performance of the Epic EHR applications. Average write latencies have been below 0.30 milliseconds, and average read latencies have been under 0.50 ms.

The de-duplication and compression features of the Pure Storage arrays have produced data-reduction rates of 3.8:1 in the VM environment, 9.7:1 for the Epic production environment, and 15.9:1 for copies of the Epic database.

This high level of data reduction has led to a dramatic reduction in space and power requirements for data storage. “We now have the entire Epic environment running in one rack,” said Chris Painter, Storage Engineer for Carilion. “Our SAN infrastructure, power and HVAC needs have been reduced by half. With the legacy storage system Epic used to run on, the racks were so heavy we had to lay down plywood to distribute the weight. Plus, we have huge savings from the capacity license and maintenance costs we were paying.”

**EFFORTLESS MANAGEMENT EASES IT STAFF’S WORKLOAD**

Painter said the biggest impact of the move to Pure Storage has been “the reduction in complexity.” For example, “putting our VM environment onto Pure has simplified the entire process. We can provision storage out to the VM administrators and let them address the LUN needs. Central IT just manages the pool layer and is not involved with growing LUNs.”

He added, “from the initial installation to configuration and deployment, Pure Storage has been simple to manage. Unless I’m provisioning, there’s not much that needs to be done, except keep an eye on the analytics tab. I also like the fact there is not a lot of tuning that needs to be done with the Pure array.”

### HAVING PURE STORAGE SMOOTHS THE PATH FOR THE FUTURE

The Carilion team also was greatly impressed by the Pure Evergreen™ Storage program, which guarantees customers non-disruptive access to the latest technology with complete protection of previous investments.

“Evergreen clearly set Pure Storage apart compared to other vendors we reviewed,” Painter said. “The concept that you never buy the same terabyte twice really struck a chord with us. It allows us to always have the latest technology and software without any downtime, and extends the life of our initial investment far beyond the standard three-year maintenance programs provided by other storage vendors. Because Pure guarantees that maintenance costs will never go up on our arrays, the cost model for our storage environment is much more predictable.”

The Evergreen model “also means we can take advantage of NVMe, the insanely fast interface protocol developed for SSD. We’ll be able to upgrade our storage systems to NVMe completely non-disruptively, reaping the benefits of added performance without dealing with the pain of a forklift upgrade.”

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