

**Riverview Health** required better-performing storage to support its widespread implementation of a virtualized computing infrastructure. By adopting the FlashStack™ converged architecture from Pure Storage, Riverview Health has seen dramatic improvements in performance and a radical simplification of storage management.



#### BUSINESS TRANSFORMATION

Doctors and other caregivers have more time to spend with patients, thanks to accelerated access to critical files and applications. The IT department spends virtually no time managing storage, and is assured of a non-disruptive and highly cost-effective path to future system expansion.

#### GEO

North America

#### INDUSTRY

Healthcare

“It’s so great that storage has been removed as a pain point.”

Jason Pearce,  
director of information  
systems infrastructure

#### RIVERVIEW HEALTH IMPROVES CAREGIVER PRODUCTIVITY WITH FLASHSTACK CONVERGED INFRASTRUCTURE FROM PURE STORAGE

Riverview Health is a comprehensive healthcare network comprised of a full-service hospital in Noblesville, Indiana, and 23 primary, immediate and specialty care facilities in the surrounding area. To support its team of more than 300 physicians, the IT staff at Riverview Health requires a performance-focused infrastructure for its electronic health records (EHR) application. The speed at which doctors can retrieve and update patient data is determined by the performance and response times of the EHR application.

Riverview Health committed to an EHR and virtual desktop infrastructure (VDI) running on Pure Storage more than three years ago, according to Jason Pearce, director of information systems infrastructure at Riverview Health. “Approximately 300 clinicians use virtual desktops as their means of accessing patient data,” he noted, adding that the objective of switching to Pure was to improve the productivity of caregivers by minimizing any delays in accessing patient data. Riverview Health wanted its caregivers to spend more time serving patients.

“We decided that we needed the fastest possible infrastructure to support our EHR application and VMware View infrastructure,” Pearce recalled. “This put us on a search for an all-flash storage solution. Something that would outperform our existing auto-tiering SAN by reducing latency and leveling performance spikes for both our EHR and VDI solutions.”

Better storage performance has significant impact in two key areas. First is accelerated access to electronic healthcare records, which helps improve patient care by eliminating productivity-impacting delays in retrieving key information. Second, improved performance helps Riverview Health meet evolving regulatory requirements and standards like “meaningful use,” a multi-stage set of objectives for the optimal use of electronic health records.

The prior hybrid storage array at Riverview Health presented challenges. The hybrid array was designed to automatically move frequently accessed data from spinning disk to the flash tier for faster access.

“But the automatic tiering provided inconsistent performance for our Microsoft SQL-based EHR system,” Pearce noted. “Performance was unpredictable. Most days, a large majority of our users would be happy most of the day because the patient records they were accessing were cached in the flash tier. Minutes later, the clinician would

**COMPANY:**

Riverview Health  
[www.riverview.org](http://www.riverview.org)

**USE CASE:**

- VDI – VMware® Horizon
- VSI – VMware® vSphere®
- Database – Microsoft® SQL Server

**CHALLENGES:**

- Performance of a tiered hybrid storage system was unpredictable.
- High latencies caused frequent delays in clinicians' access to critical data and applications.

**IT TRANSFORMATION:**

- Latencies have been reduced from as high as 8 ms to consistently around 0.5 ms.
- Throughput on the database supporting EHR applications has been boosted by 50%.
- The upgrade to an enlarged storage platform was performed during workday hours without disruption.

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Jason Pearce,  
*director of information  
 systems infrastructure*

request access to a patient's record that resided on the spinning disk and couldn't understand why it would take much longer. The unpredictable experience was often worse on Monday mornings, because the flash tier had been populated by other data over the weekend.”

Pure Storage was selected for a host of reasons: it offered predictable, high performance, low latency, in-line deduplication and compression, encryption at rest, and a predictable path for implementing future upgrades and expansion.

**SHARPLY IMPROVED PERFORMANCE FOR KEY APPLICATIONS**

After evaluating an all-flash solution, Riverview Health migrated its EHR database to a Pure Storage FlashArray™, then ran extensive diagnostics on the latency of the array. One of the first results the IT team observed was the impact of queue depth on the host's perceived storage latency, which was dramatic.

“When storage latencies dropped to 0.5 ms, it introduced new bottlenecks we had not seen before,” noted Pearce, who ended up increasing queue depth settings on the hosts. “We then introduced a mixed workload by adding 500 VMware View desktops to the Pure Storage array, which managed to maintain the 0.5 ms latency without affecting the performance of the SQL server.”

The results from moving to Pure Storage have been dramatic. The unpredictability experienced with hybrid storage has disappeared. “The Pure Storage array provides us predictable and consistent performance, along with peace of mind.”

IOPS for the SQL database supporting the EHR system increased 50 percent, while peak transactions per second tripled. Latency in the time needed to read or write to patient records, which had been as high as 8 ms, is now consistently at or below 0.5 ms. That means clinicians serving patients spend less time waiting for data or adding new information to a patient's record.

**FLASHSTACK ARCHITECTURE: A CONVERGED INFRASTRUCTURE FOR THE FUTURE**

The organization's commitment to virtualization and Pure Storage triggered a major change in its computing infrastructure. Pearce has committed to the FlashStack converged infrastructure that combines flash storage arrays from Pure Storage, VMware software, and UCS servers and Nexus switches from Cisco Systems. FlashStack configurations are pre-tested reference architectures that ensure the highest performance and easiest installation and management.

“Shortly after Pure Storage introduced its FlashStack solution, I switched over to Cisco UCS servers,” said Pearce. “With a FlashStack architecture, I know we will have an infrastructure we can leverage well into the future as we implement the next generation of applications.”

Pearce also noted that a FlashStack converged infrastructure is a lot easier to work with. “The architecture's built-in automation saves time and resources by reducing the chance of configuration mishaps or system administration errors. It has made our environment more consistent and reliable, and ensures that a single point of contact for support will be there if it's needed.”

Riverview Health also enrolled in the Pure Evergreen™ Storage program, which guarantees non-disruptive upgrades to the latest technology for arrays as long as they remain on a maintenance contract. Customers receive new controllers after three years, and when Riverview Health reached that milestone, Pearce was impressed with the ease

with which the change was made. “Pure Storage came out, replaced two controllers, added two trays of storage, and updated the firmware — all between 9:00 and noon on a Tuesday morning — with no disruption or performance degradation. The fact I would make such a major change during business hours is testimony to how much confidence I have in the Pure Storage product and the team behind it.”

Over time, more and more workloads have been added to the Pure Storage array, as both end-users and the IT staff have seen the benefits. “I tell any department that has a new application that if they want the best performance, they should virtualize it and run it on Pure Storage.”

On an average day, Pearce noted, Riverview Health runs about 550 virtual desktops and 350 virtual servers on the Pure Storage array.

### ENHANCED SECURITY, SIMPLIFIED MANAGEMENT

Pearce observed that one of the benefits of Pure Storage arrays for any company in healthcare is the inclusion, at no extra cost, of encryption at rest; a feature increasingly demanded to meet data-security requirements.

The ease of management for Pure Storage equipment has impressed Pearce and his colleagues. “No one has to spend much time managing the Pure Storage array. My engineers are able to use and administer it with little training,” said Pearce. “In addition, we don’t have to think about performance any more. When we are troubleshooting a performance problem, storage is one of the last things we think about. It’s refreshing that storage has been removed as a pain point.”

Riverview Health also has seen the benefit of working with Pure Storage from the standpoint of customer service.

During the initial evaluation period, Riverview Health experienced a technical problem with the FlashArray. “The Pure Storage support team noticed a problem and contacted me in less than 10 minutes on a weekend,” Pearce recalled. “Before I could even determine if storage was the issue, its team began seeking a remedy. Their openness and responsiveness gave us confidence that Pure cares deeply about its customers, which is why we trust Pure Storage to run our most important and performance-intensive resources.”

“Moving to all-flash from Pure Storage has removed storage as a source of performance problems,” Pearce said. “And that moves us a lot closer to our goal of improving patient care.”

“With the Pure Storage array it’s always consistent performance, and that has offered us a lot of peace of mind.”

Jason Pearce,  
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systems infrastructure



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