

**John Muir Health** installed all-flash arrays from Pure Storage to give its physicians fast, reliable access to vital information and images they need to deliver superior care to patients. Senior management can now make better-informed decisions thanks to a larger pool of operational information.

**BUSINESS TRANSFORMATION**

From physicians through senior management, decision-makers have fast, reliable access to patient records, scheduling information, billing data and other important information they require, while IT managers are freed from onerous storage management.

**GEO**

North America

**INDUSTRY**

Healthcare

“I don’t have to worry every two to three years what I am going to do next.”

Bill Hudson, *Associate CIO*

**JOHN MUIR HEALTH MODERNIZES CARE MANAGEMENT WITH NEW STORAGE INFRASTRUCTURE FROM PURE STORAGE**

John Muir Health is a major provider of healthcare in the East Bay of the greater San Francisco metro area. Its 554-bed hospital in Walnut Creek and 245-bed facility in Concord are preeminent centers for neurosciences, orthopedics, cancer and cardiovascular care, and high-risk obstetrics. The John Muir Medical Group and John Muir Physician Network bring together more than 900 physicians serving patients through 24 locations in Contra Costa, Alameda and Solano counties.

When Bill Hudson arrived at John Muir in 2016 as Associate CIO and Vice President of IT Operations, he found what he called “a United Nations of storage. We had a little bit of everything.” Hudson said the enterprise’s storage infrastructure was “very complicated, very expensive, and required lots of training. Our goal was to simplify it dramatically.”

To select a strategic storage provider for its Tier 1 applications, John Muir invited proposals from its primary incumbent vendor and Pure Storage. “Pure was ahead of the other company in terms of flash technology and its software. And the Pure Evergreen™ Storage program was a huge plus,” Hudson said. “But the primary differentiator for Pure was — and remains — the level of support they bring to our partnership.”

The Pure Evergreen Storage program guarantees customers access to the latest technology and features without forklift upgrades and with full protection of previous investment in Pure Storage solutions.

Pure Storage is now the standard for storage at John Muir Health, a decision Hudson views from a long-term perspective. “I envision a time in the near future when my data system fits in my office. Most of my compute will be through cloud service providers, and the storage I have onsite will be small, scalable and high-performance — and Pure ticks all those boxes.” The healthcare system currently has nine FlashArray™ arrays and a FlashBlade™ system.

**PURE STORAGE HANDLES MULTIPLE CONCURRENT WORKLOADS**

Within a few weeks of acquiring its Pure Storage arrays, John Muir had migrated all of its primary applications and data in a process that Hudson said “went swimmingly.” The organization’s primary IT platform is the Epic electronic health record (EHR) system, running on the Caché database. At peak times, there are around 3,700 concurrent users of the Epic system. This figure will vary based on the number of physicians in the county who are accessing the system. That’s because the healthcare provider participates in one

**COMPANY:**

John Muir Health  
[www.johnmuirhealth.com](http://www.johnmuirhealth.com)

**USE CASE:**

- Database – Microsoft® SQL Server, Epic Caché®
- Virtual Server Infrastructure – VMware® vSphere®
- Virtual Desktop Infrastructure – Horizon View®

**CHALLENGES:**

- Storage systems from numerous vendors complicated management tasks for its Tier 1 applications.
- Database size continues to grow rapidly.

**IT TRANSFORMATION:**

- High levels of data reduction lower overall storage costs.
- Consistent response times guarantee quick access to data for physicians and business analysts.
- Log-in times of virtual desktops meet or exceed goal of 12 seconds.

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Bill Hudson, *Associate CIO*

of the largest rollouts of Epic’s Community Connect program, in which smaller hospitals and practices subscribe to the Epic services hosted by John Muir.

Virtually every key clinical function at John Muir runs on Epic, except for its laboratory. This includes its billing and administrative systems, the pharmacy, operating and emergency rooms, patient data, and physician and nurse documentation, as well as population health, clinical and financial analytics and reporting. The Pure Storage arrays also support the organization’s virtualized server and desktop infrastructures, its SQL Server databases and its Sectra picture archiving and communications system (PACS).

According to Marty Tedlock, Director of Technical Services, “we moved a 6.5TB Caché database onto the Pure Storage array with no downtime.” Right after that migration, “we did some performance testing and found that the speed of our read latency decreased significantly while write cycle length had improved considerably. Storage is no longer a bottleneck.”

Immediately after installation of Pure Storage, average read latency was consistently below 0.5 milliseconds (ms), compared to previous numbers in the range of one to three ms. Average write cycle length, which had varied widely between 15 and 30 seconds, went to a very consistent level below five seconds.

Improved response times also have been noted for the Clarity reports that are produced throughout the day, drawn from data stored in Caché and accessed using Epic’s Cogito and Clarity as well as Health Catalyst applications.

**VDI IMPLEMENTATION MOVES AHEAD**

When Hudson came to John Muir, “I inherited a VDI project that was two years old and hadn’t made much progress. Pure Storage came in and as part of the Evergreen program replaced all the controllers, so that when we were ready to hit our stride with VDI, we had the latest technology. That was a huge plus, because there was no additional cost to us.”

Added Tedlock, “we now have much better responsiveness and performance on our VDI. A year ago, we had maybe 100 users at any one time; now, we consistently have 800 to 900 concurrent users. More importantly, the response times are stable and consistent. Pure Storage has a lot to do with that.”

VDI is the primary means of remote access for end-users. “It’s in all the exam rooms for outpatient settings and in our training rooms,” Tedlock noted, adding that physicians benefit the most from the reliable performance. “Regardless of where you are, log-in times are consistent and meet or exceed our goal of 12 seconds. The most important thing to me is that we don’t get calls saying it takes too long for a physician to log in.”

Looking ahead, Hudson said he expects to triple the number of concurrent VDI sessions over time, “and I have total confidence that the Pure Storage will be able to handle that without missing a beat. I’m very happy about the solid architecture we have.”

**PACS WORKLOADS MOVED TO PURE STORAGE**

Another major change in the IT infrastructure is the migration of PACS files to the all-flash Pure Storage array. “We had a lot of issues with storage for PACS,” Hudson recalled. “It was sitting on old storage devices and not running well. To say it was rickety is probably an understatement.”

With the 90TB of Sectra PACS images moved onto the FlashArray, “we now have storage that takes up significantly less space, has significantly more performance, and comes at a much better cost. With Pure Storage, we see more consistent retrieval times for studies and we no longer have any problems. That’s a huge advantage.”

## FLASHBLADE ACQUIRED FOR FUTURE INFRASTRUCTURE

John Muir has also purchased a FlashBlade system from Pure Storage as part of preparing its IT infrastructure for the future. FlashBlade is a cloud-era, dynamic data platform architected specifically to deliver the performance and scalability essential for advanced, massively parallel applications like data analytics, artificial intelligence and deep learning. Initially John Muir used it as a backup for its PACS images, and plans to explore other ways to tap its capabilities. “We’re looking at FlashBlade for additional use cases that require greater resiliency and higher performance for our most demanding workloads,” Tedlock said.

## PURE STORAGE RADICALLY SIMPLIFIES STORAGE ADMINISTRATION

For the IT professionals at John Muir, adoption of Pure Storage as the platform of choice has meant sharply lower demands for storage maintenance.

“After years of dealing with the complexity of legacy storage management, working with Pure Storage is a breath of fresh air,” Tedlock reported. “The Pure1® app on my phone is incredibly helpful, giving me all I need to know anytime, anywhere.”

He singled out provisioning VDI as a good example of the effortless management of Pure Storage. “Provisioning new pools is considerably faster. With our legacy storage, we used to need two or three people to coordinate things — provision the LUNs, then present them through FiberChannel to the VMware engineers. It might have taken an hour or two. With Pure, it takes about 20 minutes and a few clicks of the mouse.”

John Muir also takes advantage of some of the features included as standard in Purity software that other vendors either charge additionally for or don’t offer at all. This includes key functions such as encryption at rest (essential for HIPAA compliance), and snapshots, which are used for backing up large databases.

The hospital also is interested in the Pure Storage ActiveCluster solution, a true active/active metro stretched cluster that is offered as a free upgrade to Purity software for FlashArray//M customers. “We have two data centers in Walnut Creek, and we’re very interested in ActiveCluster,” Tedlock said. “We’re heavily virtualized with VMware, and the ability of the two arrays to move data between the data centers is very important for business continuity.”

Tedlock is especially enthusiastic about the data reduction achieved through the Pure Storage de-duplication and compression features. “On our main Caché database, we consistently get 10.7:1 data reduction,” he reported. “That database continues to grow — it went from 6.5TB to 9TB in just a year — yet the data reduction ratio stays the same. The more information we put into the database, the more de-dupe we get. Over time, that significantly lowers our cost of storage.”

Tedlock said he and his colleagues follow a rigorous discipline to achieve such high data reduction rates. “You need to be mindful of what goes on the arrays to get that level of de-dupe. We have gotten smarter about picking the applications and databases to keep those rates up. In fact, we enjoy figuring out what we can throw on the arrays next and keep de-dupe the same.”

Hudson agrees that having Pure Storage as a technology partner is a sound decision for the long term. “With Pure, I know the performance is always going to be there for whatever we want to achieve. And I don’t worry about hardware obsolescence like I do with other platforms. I don’t have to worry every two to three years what I am going to do next.”

“The more information we put into the database, the more de-dupe we get. With Pure Storage, storage is no longer something I need to worry about”

Marty Tedlock,  
Director Technical Services



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