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Case Study:

Consolidating Windows Storage and Servers Yields Big Benefits

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Keith has been IT director at Osiris for the past 2.5 years. His primary objective is to support the company's goal of achieving FDA approval by making sure that IT is fast and efficient. Prior to Osiris, he spent 1.5 years as an IT project manager for LCG Technologies and four years as IT director for a venture capital firm.

Taking a new therapeutic agent through all phases of the clinical trial process is an expensive, time-consuming, and data-intensive process that can tax the resources—especially the IT resources—of a small company.

When I joined Osiris Therapeutics two and a half years ago, we were in the midst of clinical trials to bring the world's first stem cell therapy to market, and our data storage needs were growing exponentially. Since then, we've evolved the infrastructure to fully virtualize our Windows® servers with all Windows storage and file serving consolidated on a single, clustered NetApp® storage system for improved availability, scalability, and ease of management. This infrastructure is designed not only to meet our needs now, but also to grow with us over at least the next 12 to 24 months, so we're no longer constantly struggling to maintain enough available storage.

In this article, I'll examine the evolution of our infrastructure and describe where we are now and where we're headed. I'll also talk about why we made the decisions we have and the importance of choosing the right partners.

STRUGGLING WITH EXPONENTIAL DATA GROWTH

When I joined Osiris, we had in place a pretty standard Windows environment with a combination of physical and VMware® virtual servers running Microsoft® Exchange, Microsoft SQL Server®, and Symantec™ Enterprise Vault™, plus several Windows file servers. All servers had local storage.

SAN Fails to Address Growth Needs

We quickly realized that this approach could not continue and implemented a 6TB iSCSI SAN using an HP storage array. We used the SAN for VMware virtual machines, archived e-mail storage and other needs, and quickly outgrew it. We ended up buying a second HP array to address virtual machine performance issues and again had to add an additional disk shelf almost immediately because we were still running out of space.

Windows File Server Woes

On the Windows file server side, we had similar problems. The mountains of file data coming in from clinical trials was stored on Windows file servers with local disk storage. We quickly expanded from one file server to three file servers. We were continuously adding more disks and resorted to compressing files and folders in some cases to meet our space needs.

ABOUT OSIRIS THERAPEUTICS

Osiris Therapeutics, Inc. has been working since 1992 to develop and commercialize cellular therapies based on stem cells isolated from readily available and noncontroversial adult bone marrow. These stem cells offer the opportunity to provide revolutionary treatments for a variety of ailments such as osteoarthritis, heart attack, type 1 diabetes, and Crohn's disease.

A treatment for graft versus host disease (GvHD) just completed Phase III clinical trials.

[Read more \(www.osiristx.com\)](http://www.osiristx.com).

ABOUT CTI

CTI—Osiris Therapeutics technology partner—is a systems integrator serving small-, mid-, and large-sized businesses in Maryland; Washington, DC; and central Pennsylvania. CTI provides a full spectrum of IT services, including:

- Storage
- Virtualization
- E-mail and document archiving
- Network security
- Business continuity and DR
- Platform upgrades

CTI is a NetApp Gold Partner. [Read more \(www.webcti.com\)](http://www.webcti.com).

Time to Reassess

At this point we took a step back to ask what solution could carry us through the next two years, rather than having to apply a band-aid every six months or less to meet our storage growth. We started looking at NetApp plus a variety of other offerings from HP, Dell, EMC, and others.

Ultimately we settled on NetApp because I want the partner that I trust with my infrastructure to be more interested in building a relationship toward the future than just selling me a box. With our system integrator, CTI, and NetApp that was what we got. I also really liked the versatility of the NetApp unified storage architecture, which gave us the ability to support all the protocols we needed—NFS, CIFS, and iSCSI—on a single platform. A single storage system with a single management interface and data protection strategy would replace all our existing storage, including SAN storage, local disks, and Windows file servers. We also saw that deduplication was going to be key for us, and we liked the phone home capabilities that the NetApp system offered.

CONSOLIDATING WITH NETAPP

We worked with CTI to develop a full plan to consolidate onto a NetApp 2050c with 17TB of raw storage and the ability to meet our iSCSI, CIFS, and NFS needs. This plan contained a number of elements:

- Consolidate VMware data stores using NFS
- Consolidate existing Microsoft SQL Server databases and logs using iSCSI
- Virtualize Symantec Enterprise Vault (P2V) and centralize storage using NFS
- Perform a physical-to-virtual (P2V) Exchange migration
- Migrate Windows file shares to NetApp
- Implement appropriate elements from the NetApp SnapManager® Suite for Virtual Infrastructure, Exchange, and SQL Server

VMware on NFS

We chose to move our VMware data stores from iSCSI to NFS for performance and ease of backup based on CTI's recommendation and have been happy with that decision. SnapManager for Virtual Infrastructure (SMVI) was implemented to facilitate data management and backup for the VMware environment, replacing our previous vRanger implementation. We do daily Snapshot™ copies combined with weekly backups to tape to protect this environment.

We've implemented deduplication in our VMware environment to eliminate the storage duplication that arises from having multiple virtual machines running the same operating system.

SQL Server and Enterprise Vault

We use Microsoft SQL Server databases primarily to support our Blackberry server and Symantec Enterprise Vault. Because the SQL Server units were already virtualized, it was simply a matter of migrating storage from the SAN to NetApp. NetApp SnapManager for SQL Server gives us backup and other functionality analogous to SMVI for this environment.

Enterprise Vault was still running on a physical server. As part of the project, we did a P2V migration of the server and moved the vault to an NFS volume on the NetApp storage.

Exchange

Because of the ongoing clinical trials, communication within the company, with partners, and with hospitals participating in the trials is critical, and protecting that information is vital. The Food and Drug Administration (FDA) has several guidelines for data supporting clinical trials. The system or systems have to be dependable with both physical and logical security. We need to

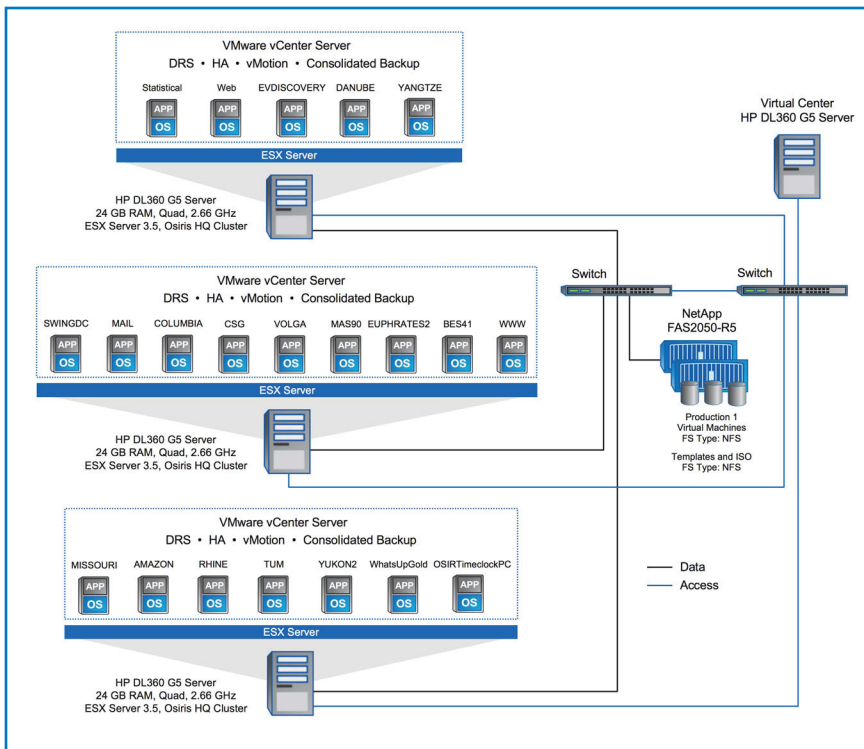


Figure 1) Osiris Therapeutics' current Windows environment.

provide audit trails of file and folder access as well as accurate date and time stamps. We can't accomplish this using traditional servers based on Windows with local storage and making changes every other year.

We previously kept Exchange on a physical server because of concerns about performance, but the P2V migration and the transition to NetApp for back-end storage has created no issues. As with the other application environments, we've implemented SnapManager for Exchange (SME) for fast, consistent backups. Using SME, we make hourly Snapshot copies of our Exchange environment to protect this critical resource.

Windows File Shares

Largely because of the clinical trials, the data in our file shares has grown more than sixfold over the past 2.5 years. Migrating everything from our three Windows file servers to the central NetApp storage system eliminates three servers and allows us to make Snapshot copies of this critical data every hour. We're also in the process of converting paper documentation to electronic form to accelerate access to data that might previously have required us to request paper records retrieval from Iron Mountain.

RESULTS SO FAR

All phases of this transition were implemented in June 2009, and we've been extremely happy with how it went. As a result of these changes we retired:

- Five physical servers and associated direct-attached storage (DAS)
- Two HP SANs with 6TB of SATA and 1TB of SAS storage

Osiris Therapeutics' current Windows environment is shown in Figure 1 above.

While I haven't made any direct efforts to quantify the savings, we did drop from four ceiling-based air-conditioning units to two floor units because of the substantial reduction in heat output. Obviously, that corresponds to less electricity used by the infrastructure and less electricity needed for cooling.

Deduplication

Additional savings result from the use of NetApp deduplication on our primary storage. Deduplication on our CIFS and NFS volumes results in significant savings:

- CIFS: 35%
- NFS: 22% to 76%

In addition, we can now add additional virtual servers with almost no additional storage consumed because deduplication eliminates redundancy in virtual server environments.

Rationalized Backup

From a management standpoint, the biggest savings result from rationalizing our approach to backup. Previously, we struggled with four different methods of backup. Now we make hourly Snapshot copies for the most critical applications (Exchange and file storage) and daily Snapshot copies of the rest (including SQL Server and Enterprise Vault). Instead of hours to do backups it takes seconds; restores are just as quick, and we've noticed no issues or conflicts with VMware features such as VMotion®. In addition, backups always succeed, and we get regular notifications to tell us so. With our previous methods, backup failures were common.

NetApp SnapManager tools automate the process and make sure that backups are consistent for our VMware environment, Exchange, and SQL Server. We used to suffer noticeable database drops from our Blackberry server when running SQL Server backups, but these have been eliminated.

Simple, Fast Management

Overall, I've been surprised how user-friendly the NetApp storage system is to manage compared to other storage I've worked with such as EMC and HP. Recently, we had a problem with Enterprise Vault when we changed our retention policy and had to do a complete dump back to Exchange. Even though both the vault and the Exchange database were on NetApp storage, the process proceeded very quickly. When Exchange ran out of space, I was able to expand the volume on the fly so the dump could continue. This was a real lifesaver, and the process completed quickly after that.

Performance

From a performance standpoint, we've seen the same or better performance across the board as a result of these changes. Enterprise Vault performance has actually gotten better since the server has been virtualized because both the database and vault are now spread across far more disk spindles than they had been previously. (NetApp flexible volumes—FlexVol® volumes—automatically spread I/O for

each volume across the maximum number of spindles possible.) The same goes for Exchange. We reduced the amount of RAM allocated to Exchange from 16GB on the physical server down to 6GB on the virtual server, and performance is still better because of improved I/O.

READY FOR THE FUTURE

All the improvements I've mentioned above are important, but for Osiris the biggest benefit is that our scientists can now do their jobs without concern for possible IT or data storage limitations. We used to sometimes ask external vendors to house data for us; we can now bring that data in house and analyze it quickly and efficiently, and—because our data is better protected—we all rest easier. This solution lets us work more efficiently now and prepares us to meet our growth needs for the foreseeable future.

The next step for us will be to implement SnapMirror® to allow us to replicate critical data off-site. We expect to implement that solution as soon as we reach the point where off-site storage is needed. We'll

also be looking at adding Single Mailbox Recovery for Exchange.

The new technology in this deployment was easy to implement and set up. Osiris Therapeutics is a small organization with just 70 employees and two dedicated IT staff. Having reliable partners such as NetApp and CTI was essential to making this project a success. The technical experts at CTI helped us make sure that all phases of the plan were implemented quickly and with as little disruption as possible.

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