



# Optimizing Citrix® XenDesktop™ VDI Solutions with Sanbolic® Melio 2010™ and SAN Storage

## White Paper

By Andrew Melmed, Director of Enterprise Solutions, Sanbolic, Inc.

April 2010



[www.sanbolic.com](http://www.sanbolic.com)



## Introduction

**Citrix® XenDesktop™** is a comprehensive desktop delivery solution that allows organizations to extend the longevity of their current hardware, improve the return on their investments in new hardware and greatly simplify and enhance the management and delivery of desktops and applications.

Using XenDesktop, organizations are able to manage and deliver hosted and streamed desktops throughout their enterprise environment on demand from a central console. Users can access virtual desktops (and any applications installed within the virtual desktops) running remotely on XenServer™ virtual machines and can access other applications running remotely on XenApp™ servers or streamed to their local devices.

As organizations consider the numerous benefits afforded by the rapid and dynamic delivery of desktops and applications and contemplate the migration of their current desktop infrastructure to this new desktop delivery paradigm, several key aspects of the solution must be thoroughly scrutinized.

**Performance** – Will users experience the same levels of desktop and application performance that they experience now?

The performance of hosted desktops and applications must be optimized to ensure that, from the user's perspective, there are no discernable differences from desktops and applications running on their local machines.

**Scalability / Scale-out** – Will there be an easy way to expand the virtual desktop and application delivery infrastructures as our needs and the needs of our users grow?

There must be a way to quickly and seamlessly expand the virtual desktop and application delivery infrastructures to support more desktops, more servers and more applications without introducing additional administrative overhead and without affecting the user experience.

**Business Continuity** – Will user productivity be maintained during unexpected failures or outages?

The continuous availability of hosted/streamed desktops and applications as well as all essential virtual desktop and application delivery infrastructure components (i.e., XenDesktop Delivery Controllers, Web Interface and XenApp servers) must be ensured to maximize user productivity.

**Manageability** – Will it be easier or more difficult to manage desktops and applications?

The virtual desktop and application delivery infrastructure must provide a simple, cost-effective way to manage desktop images and applications (i.e., consolidation and centralized management).

**Data Protection** – Will there be an easy way to protect desktop and VDI component images, i.e., backup and recover all images?

There must be a simple and effective way to backup and recover images for hosted and streamed desktops as well as XenDesktop Delivery Controllers, Web Interface and XenApp servers.

## Storage considerations for Citrix XenDesktop VDI solutions

The driving engine behind XenDesktop is Provisioning Services™, also known as PVS™, an essential infrastructure component of the VDI solution that is used to stream images (vDisks) to target devices (i.e., virtual machines hosting virtual desktops, physical machines and various other systems that serve as the fundamental building blocks of a XenDesktop VDI solution, including the XenDesktop Delivery Controllers, Web Interface and XenApp servers). To ensure target devices maintain continuous access to PVS vDisks, Provisioning Services includes a high availability (HA) component that requires all Provisioning Servers have access to the PVS datastore containing the vDisks. Providing multiple Provisioning Servers with simultaneous read and write access to the PVS datastore is best accomplished using shared storage.

While there are numerous shared storage options available to enable PVS HA, readers who refer to the *Virtualization Infrastructure Design* section of the Citrix Systems' white paper "**Designing an Enterprise XenDesktop Solution**" will note that Tier-2 Fibre Channel SAN storage is proposed for the Provisioning Services Infrastructure (PSI), as well as for every other infrastructure defined within the XenDesktop VDI solution, including the XenDesktop, XenApp and Hosted Desktop infrastructures. In fact, the only infrastructure for which SAN storage is not proposed is the PVS Remote infrastructure, for which local storage on the Provisioning Servers themselves is suggested in order to minimize the number of components necessary to extend the benefits of the VDI solution to remote offices.

Although the use of SAN storage is suggested in order to optimize the XenDesktop deployment showcased within the Citrix white paper, SAN storage has an innate limitation whereby only one device can have read and write access to a logical unit number (LUN) at any time. This means that multiple Provisioning Servers would not be able to share a single LUN containing the PVS datastore to enable high availability for vDisks. In fact, the only way to garner the benefits of both SAN storage and shared storage is through the use of a cluster file system, which provides the locking mechanisms necessary to allow multiple devices to share simultaneous read and write access to a single LUN at all times.

Besides underscoring the storage aspect of a XenDesktop VDI solution, the Citrix white paper also places strong emphasis on ensuring the scalability of a XenDesktop VDI solution, highlighting the need for their conceptual environment of 8,000 hosted and streamed desktops to be able to scale so that new farms, resource pools and servers can all be integrated into the infrastructure quickly and seamlessly (refer to the *Conceptual Architecture* section of the white paper).

So how can organizations take advantage of the benefits of SAN storage (i.e., performance, scalability and reliability) to achieve the levels of performance, scalability, availability and manageability necessary to ensure the greatest return on their investments in a Citrix XenDesktop VDI solution?

**Answer:** Deploy a Citrix XenDesktop VDI solution with **Sanbolic® Melio 2010™** SAN software and SAN storage.

## Optimizing Citrix XenDesktop VDI solutions with Sanbolic Melio 2010 and SAN storage

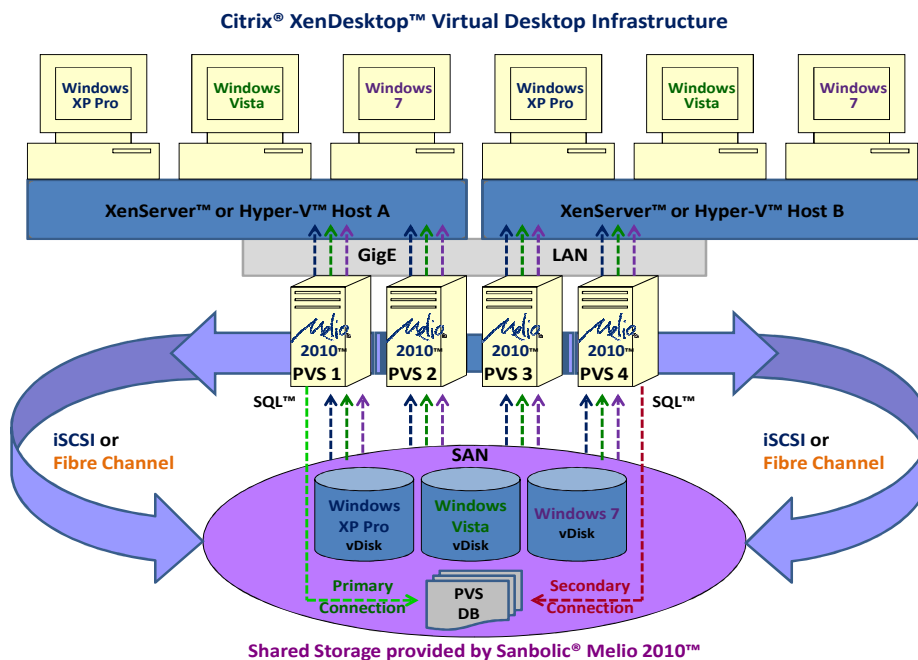
**Sanbolic Melio 2010** is a feature-rich product suite comprised of various applications designed to work together to share, simplify and enhance SAN storage. At the core of Melio 2010 is an advanced, all-purpose, 64 bit symmetrical cluster file system that allows multiple devices to share simultaneous read and write access to LUNs on SAN storage and a cluster volume manager that simplifies the management of Melio shared storage while providing advanced functionality such as the creation of volume sets and stripe sets to improve storage performance, as well as dynamic volume expansion.


Using Sanbolic Melio 2010 and SAN storage, organizations can achieve all of the key aspects necessary to optimize a Citrix XenDesktop VDI solution:

- High performance via block-based access to storage and dedicated I/O paths
- Scalability to add more desktops, servers and storage quickly and seamlessly
- High availability for PVS vDisks and PVS databases
- Centralized management of storage resources for PVS datastores
- Data protection in the form of VSS-based snapshots for backup and recovery of vDisks

Melio 2010 SAN software installs quickly and easily on the Provisioning Servers and works with industry-standard server and SAN hardware, allowing the servers to share concurrent read and write access to a single LUN containing the vDisks within minutes. And best of all, Melio 2010 does not introduce any of the complexities or constraints associated with file-based shared storage solutions that often have an adverse affect on system performance, scalability and availability.

The figure presented below illustrates a highly scalable and highly available Citrix XenDesktop virtual desktop infrastructure built on Citrix XenServer™ or Microsoft® Hyper-V™, Sanbolic Melio 2010 and SAN storage.






For many organizations, it was only shortly after commencing with the test phase of a Citrix XenDesktop VDI solution that performance and scalability issues arose, stemming from the use of file-based shared storage to support the Provisioning Services Infrastructure. These organizations turned to Sanbolic to help them design a VDI solution that incorporated the use of shared SAN storage to address each of the key aspects emphasized in the Citrix white paper (i.e., performance, scalability, availability and manageability) in order to optimize the solution and ensure a faster and greater return on their XenDesktop investments.

Using file-based storage, organizations that attempted to provision additional virtual machines to expand their existing hosted desktop infrastructures often encountered performance degradation as a result of the locking contention issues incurred by CIFS and NFS in mid to larger size file-sharing environments and the shuttling of storage operations over the same network used for vDisk streaming. Implementing more Provisioning Servers to stream vDisks to additional desktops taxed the file-based storage and network infrastructure even further, making it extremely difficult, if not impossible to scale the VDI solution to meet future needs while maintaining the high levels of performance necessary to ensure a rich user experience.

Sanbolic Melio FS works with block-based storage and thus, does not rely on CIFS or NFS to access data. Dedicated I/O paths are established between each Provisioning Server and SAN storage via Fibre Channel or iSCSI, thereby offloading storage operations from the LAN. This approach allows organizations to quickly and seamlessly add more desktops and more servers to their hosted desktop and Provisioning Services infrastructures, respectively, without impacting system performance.

For other organizations testing XenDesktop with file-based shared storage solutions, it became apparent that individual failures of the components making up these storage solutions introduced the potential to cause wide-spread disruptions in user productivity, particularly when the vDisks were stored on a file share hosted by a single server or on a NAS device. Attempts to address the single points of failure associated with these solutions required the use of additional components and more complex configurations in the form of Windows Failover Clusters or clustered NAS devices, both of which had a negative impact on performance due to the additional traffic levels presented to the network infrastructure. In addition, the active/passive operational mode of Windows Failover Clustering had a significant effect on overall system performance as only one Provisioning Server was able to access the drive containing the vDisks at any given time. This prevented organizations from maximizing network throughput when multiple Provisioning Servers streamed vDisks to target devices in tandem as all other servers that did not have direct access to the drive containing the vDisks were forced to access the vDisks through the one server that did have direct access to the drive in order for the load-balancing feature of PVS HA to be leveraged.

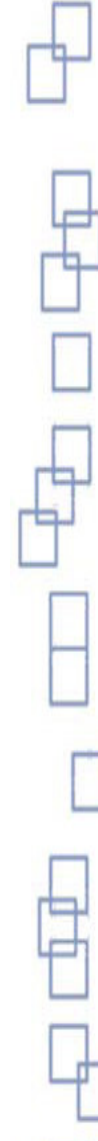
Some organizations made other efforts to work around the single points of failure associated with file-based shared storage solutions by assigning a separate LUN to each Provisioning Server. However, this approach added significant overhead to the management of vDisks as every time a change was made to the contents of a vDisk, the updated vDisk had to be copied to each LUN in order to ensure that each Provisioning Server streamed the most current version of the vDisk to target devices. The ability to scale their XenDesktop infrastructures was also affected as every time a new Provisioning Server was added to support an increase in the number of devices, an additional LUN had to be created, forcing IT administrators to copy vDisks to a greater number of LUNs each time a change was made to the contents of a vDisk. Lastly, poor utilization of



both network bandwidth (the updated vDisk had to be copied over the LAN between Provisioning Servers) and storage resources (more LUNs with relatively low utilization levels) were experienced with this approach.

Using high performance, highly scalable, highly available and easy-to-manage shared storage provided by Sanbolic Melio 2010 and SAN storage, these organizations were able to achieve all the key aspects of an optimized XenDesktop VDI solution. Block-based access and dedicated bandwidth to shared storage for solid performance; the ability to add more desktops and more Provisioning Servers to the hosted desktop and Provisioning Services infrastructures quickly and seamlessly; the ability to add more storage resources on the fly to expand storage capacity and improve I/O performance; increased system resiliency in the form of fault-tolerance for target devices as all Provisioning Servers maintain read and write access to both metadata and vDisks when one or more servers fails unexpectedly; simplified management of desktop and VDI component images as only one LUN is necessary to store all vDisks, with changes to the contents of vDisks automatically and immediately available to all Provisioning Servers; and image protection in the form of VSS-based snapshots, allowing IT administrators to backup and recover vDisks at any point in time.

## Conclusion



Deploying **Citrix XenDesktop** with **Sanbolic Melio 2010** SAN software and SAN storage offers organizations a high performance, highly scalable, highly available and easy-to-manage virtual desktop solution that allows IT administrators to focus their time and energy on managing their virtual desktop infrastructures and not the backend storage responsible for optimizing the VDI solution.

**Citrix** is registered to **Citrix Systems, Inc.** All rights reserved.

**Provisioning Services (PVS), XenServer, XenDesktop and XenApp** are registered trademarks of **Citrix Systems, Inc.** All rights reserved.

**Microsoft** is registered to **Microsoft Corp.** All rights reserved.

**Hyper-V** is a registered trademark of **Microsoft Corp.** All rights reserved.

**Sanbolic** is registered to **Sanbolic, Inc.** All rights reserved.

**Melio 2010** is a registered trademark of **Sanbolic, Inc.** All rights reserved.

**Sanbolic Inc.**

304 Pleasant Street, 2nd Floor

Watertown, MA 02472

Phone: 617-833-4249

Fax: 617-926-2808

Email: [sales@sanbolic.com](mailto:sales@sanbolic.com)

