



# Creating Scalable File-Serving Clusters with Microsoft® Windows® Storage Server 2008 R2™ and Sanbolic® Melio 2010™

## White Paper

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## Introduction

**Microsoft® Windows® Server 2008 R2™** is frequently deployed in small- to mid-size environments for file-serving purposes. In these situations, I/O performance is often determined by the disk drive configuration and the server hardware, which is typically industry-standard servers based on Intel or AMD server technologies. And while many customers consider Windows Server 2008 R2 an effective file-serving solution for their initial or less-extensive file-serving needs, these same customers often implement larger, more expensive, proprietary file-serving appliances when their requirements expand beyond the capabilities of a single server. Unfortunately, the use of file-serving appliances introduces its own set of issues, including limitations in scale-out and availability, as well as the additional costs and complexities associated with managing proprietary island systems.

By harnessing the combined capabilities of **Microsoft Windows Storage Server 2008 R2™**, **Sanbolic Melio 2010**, and SAN storage, organizations are able to take advantage of block-based storage that is accessible by multiple servers simultaneously to create highly scalable, highly available file-serving clusters that can effectively meet both current and future demands, regardless of the intensity of those demands.

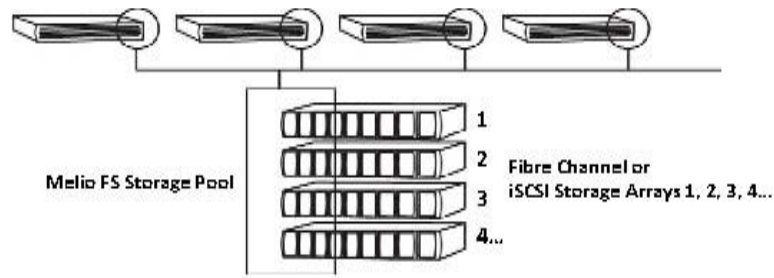
File-serving solutions based on Windows Storage Server 2008 R2 and Sanbolic Melio 2010 offer organizations the flexibility to incorporate file-serving via CIFS or NFS with iSCSI for applications requiring access to block-based storage. In addition, servers can use their internal disk drives or, even better, connect to external storage arrays to enable future growth and/or seamless integration into an existing SAN infrastructure.

Employing a combination of multi-core processors, 64-bit system architectures and Sanbolic's Melio 2010 SAN software, customers have the option of expanding their Windows Storage Server 2008 R2-based file serving systems on demand, without any interruption to user productivity, to meet the needs of applications requiring petabytes of storage capacity and gigabytes/sec. of throughput. Built on cost-effective industry-standard server hardware, these clustered systems are highly redundant for improved fault-tolerance. In addition, manageability is greatly simplified through the use of a single name space, with all Storage Servers in the cluster accessing a common file system. This solution also allows administrators to utilize Windows management tools such as Active Directory and DFS, as well as various security features native to Windows.

## Scalable File-Serving Using External Storage

Using Melio FS, the advanced, 64-bit symmetrical cluster file system at the core of Melio 2010, multiple Windows Storage Server 2008 R2 file servers can be clustered into a common file system on external SAN storage. With this configuration, all servers share concurrent read-and-write access to the shared storage provided by the Melio FS cluster file system, allowing a file call to be processed by any server in the cluster. Microsoft DFS can be used to fail over, load balance, and distribute CIFS file calls among the Storage Servers while providing a single network address seen by clients on the network. Additional servers and additional storage arrays can be added dynamically to the cluster to expand I/O performance and/or storage capacity without I/O interruption as client systems continue to access data. (See the following illustration.)

## Scalable File-serving using External Storage



Multiple servers accessing "one pool" of scalable storage

I/O performance scales linearly as additional Windows Storage Server 2008 R2 machines are added to the cluster. An eight-node cluster has demonstrated 200,000 IOPS/second. Up to 64 nodes in a cluster have been demonstrated, and larger clusters are possible. The system can provide aggregate throughput of multiple gigabytes per second. With its 64-bit file system architecture, Melio FS provides support for volume and file system sizes of up to 18 million terabytes.

The external storage connected to the Windows Storage Server cluster can incorporate multiple tiers of disk arrays. Sanbolic's own integrated file management product, SILM, can be used to migrate or copy files across storage tiers automatically based on pre-defined user-based policies.

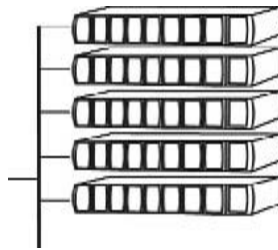
## Scalable File-Serving Using Internal Storage

Windows Storage Server 2008 R2 provides the capability to present internal and external storage as an iSCSI target. Using this feature, the Melio FS cluster file system, in collaboration with Sanbolic's LaScala volume manager, allow the internal disk drives of multiple Windows Storage Server 2008 R2 machines to be clustered into one large pool of storage. The storage pool can then be accessed by clients using CIFS or NFS through the Windows Storage Servers, which have direct, block-level access to the storage pool.

Industry-standard servers running Windows Storage Server 2008 R2 with multiple internal drives can be used as modular "building blocks" to create a highly scalable and highly available storage system that can support hundreds of terabytes of storage. I/O and storage capacity can be added modularly to the active cluster "on-the-fly."

The large storage pool can also be accessed by application servers over iSCSI. If the application servers are running Sanbolic Melio 2010, the block storage pool can be centrally configured and assigned to application servers, allowing multiple application servers to share concurrent read/write access to data in the storage pool over the iSCSI connection. (See the preceding illustration.)

## Scalable File-serving using Internal Storage



Benefits of using internal storage:

- Industry-standard servers.
- Each server runs Microsoft Windows Storage Server 2008 R2 and Sanbolic Melio 2010 SAN software.
- Servers have multiple internal disk drives.
- Melio FS and LaScala aggregate internal drives into a single storage pool.
- All Storage Servers provide access to the storage pool using CIFS or NFS.
- Application servers share block-level access to the storage pool using iSCSI.

## Summary of Features

The modular scalability of storage systems powered by Microsoft Windows Storage Server 2008 R2 and Sanbolic Melio 2010 provides customers with the flexibility to use internal and/or external storage to expand storage capacity, while using industry-standard server hardware to modularly increase I/O performance. Both storage capacity and I/O performance can be expanded dynamically while data is accessed. Customers are free to use their preferred hardware vendor and can rapidly incorporate performance enhancements in processors, disk drives and network.

Scalable file-serving clusters comprised of Microsoft Windows Storage Server 2008 R2 and Sanbolic Melio 2010 offer flexible, fully-featured, highly available storage systems without the costs and complexities associated with proprietary hardware-based, file-serving solutions.

- Built on industry-standard servers using Windows Storage Server 2008 R2 ---no need to introduce proprietary hardware and management tools.
- Sanbolic's Melio FS turns Windows Storage Server 2008 R2 into a high-end solution—allows users to modularly scale systems to Petabytes of storage.
- Melio FS is a 64-bit file system--which supports a maximum volume size of 18 million terabytes, effectively removing size limitations.
- Familiar Windows-based system reduces operational expenses.
- No single point of failure--inherent system redundancy.
- Any server can handle any file request, eliminating the need for passive fail-over servers. Windows Failover Clustering can be implemented for additional resiliency and availability.
- Reduces initial purchase price and total cost of NAS ownership versus proprietary appliance-based file-serving solutions.
- Enables dynamic volume expansion to increase storage capacity and improve I/O performance.
- Simple to install, deploy and manage.



## Conclusion

Windows servers are often used to provide file services within small- to mid-size environments. However, as data growth continues unabated, fueled by today's data-intensive mission and/or business-critical applications, organizations are looking to larger, more expensive, proprietary file-serving appliances to ensure data is accessible to users at all times.

Deploying file-serving clusters comprised of **Microsoft Windows Storage Server 2008 R2**, **Sanbolic Melio 2010**, and SAN storage offers organizations the flexibility to utilize external storage to improve I/O performance and increase storage capacity on demand, while providing uninterrupted access to data to maximize user productivity. Best of all, using industry-standard server hardware, administrators are able to increase I/O performance granularly through enhancements to processors, disk drives, and network adapters. The end result – a highly scalable, highly available, easy-to-manage file-serving solution capable of meeting both current and future demands, without introducing the costs and complexities associated with proprietary file-serving, appliance-based solutions.

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