



Sanbolic Melio FS Turns Windows NAS Into High-End Solution

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Management Summary

Purchasing decisions usually involve tradeoffs. For instance, does one choose inexpensive, quasi-nutritious fast food as a meal, or take time for a healthier sit-down meal that costs more but tastes better too? And which is preferable for a long-distance trip – a slow train ride through the scenic countryside or a quick flyover at 40,000 feet? The answers depend on what you want - and need - at the time, and the decisions require trading one benefit for another.

Many enterprise purchase networked-attached storage (NAS) solutions to provide file storage and sharing. These solutions are broadly divided into three categories, each with their respective tradeoffs. Enterprises tend to gravitate toward one or another based on their requirements:

- **High-end NAS** offers the utmost in scalability, performance, availability, and centralized management. It is also priced at the upper end of the scale.
- **Entry-level appliances**, often based on a specialized Microsoft *Windows* platform for file services, offer modest pricing and easy deployment, though less robustness and scalability.
- **NAS gateways** offer choice of storage and the ability to consolidate block and file storage into a single SAN infrastructure. The tradeoff for this extra flexibility and efficiency is a little more integration and deployment work than with a plug-and-play appliance.

The IT vendor Sanbolic (sanbolic.com) has introduced a NAS solution that actually spans all three categories. It combines Sanbolic's *Melio File System* (FS), Windows-based NAS platforms, and the customer's choice of storage. **Melio FS is a distributed file system that allows multiple servers to access a common file system and storage pool.** Standard Intel servers running Window NAS software and Melio FS act as gateways into the pool.

The Melio FS/Windows solution scales performance and capacity to high-end levels by adding incremental gateways and storage capacity, respectively. It offers a degree of centralized management, and redundant NAS servers deliver high availability. Since it employs gateways, it is flexible about storage used and necessitates some integration. **The clincher is that Melio FS's modular architecture and use of Windows allow it to be priced at a fraction of mainstream high-end solutions.**

The Melio FS/Windows NAS solution is **unique alternative that challenges the traditional tradeoffs involved in a NAS purchase.** Read on for details.

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NAS – A Matter of Scale

Many enterprises deploy NAS to provide broad file access over an IP network. Like a town water tower, it is a sort of public utility for everyone to access. Users can store and share files in a common place, which facilitates workflows on a departmental level and helps ensure important information can be centrally protected. NAS is increasingly used as a target for disk-based backup, as well, because of the relative ease of integrating it into backup environments. Some enterprises even run transaction-oriented applications like databases and e-mail on NAS because of its management simplicity. NAS is a form of networked storage, which enterprises have been turning to en masse for storage consolidation and the associated benefits of higher utilization, simpler management and backup processes, improved storage service levels, and a lower total cost of ownership.

The right NAS solution is a matter of scale, among other factors. A small enterprise or branch office with limited storage requirements may find that a single, entry-level NAS appliance works well. However, **a larger IT operation that tries to scale its NAS infrastructure by adding more and more appliances can end up with an abundance of hard-to-manage storage silos. This creates similar types of complexity and inefficiency that caused it to consider networked storage in the first place.** A high-end NAS solution designed for large-scale deployment would be a much better fit in this case. It is a significantly larger upfront investment, but enterprises justify it because improved manageability and service levels more than compensate in the long run.

Melio FS and Windows NAS Solution

Sanbolic has a NAS solution suitable for large-scale environments that retains some of the pricing advantages of entry-level appliances. The enabling technology is its *Melio File System* (FS), a symmetrical

distributed file system¹ for SAN environments. (See sidebar on the following page for details.) It allows a group of servers to access a common file system, even reading and writing to the same file simultaneously. Melio FS can form the basis of a consolidated NAS solution in which all gateways (or servers or heads) can export all files and directories – all of the time.

Sanbolic uses ubiquitous, low-cost Windows NAS platform as gateways. Microsoft developed this platform as a specialized version of Windows for hosting file and print services. The latest version is called *Windows Storage Server 2003*.² It is available from a number of OEM vendors³ that integrate the software with their own Intel servers and disk arrays and offer the package as an entry-level or midrange NAS appliance. Impressively, these Windows appliances now dominate the entry-level category and claim the largest unit share of the overall NAS market.

Sanbolic's solution is comprised of multiple Windows NAS servers running the Melio FS that are connected to a common pool of storage over a Fibre Channel or iSCSI SAN. The storage can be any brand or model that supports Windows, including storage already in place. Array- or network-based⁴ replication software (e.g., point-in-time copy, mirroring) can be used for data protection and disaster recovery. Users and application servers can access files over the LAN through any of the Windows NAS servers using standard protocols like *CIFS* and *NFS*.

¹ For more information about this technology, see *Consolidated File Systems – Relieving the Pains of Scale in Data Storage* in **The Clipper Group Explorer** dated January 30, 2003, at <http://www.clipper.com/research/TCG2003003.pdf>.

² Previous versions were dubbed *Windows-powered NAS* and *Windows Server Appliance Kit* (SAK).

³ OEMs include Dell, HP, EMC, Fujitsu Siemens, Inline, Iomega, Coastline Micro, and NEC.

⁴ See *Intelligent Storage Networking – Poised for Broad Adoption* in **The Clipper Group Explorer** dated October 16, 2003, at <http://www.clipper.com/research/TCG2003054.pdf>.

Windows' own network load-balancing capability or a load balancer from a third party distributes file requests evenly across the NAS servers to maximize performance as well as redirect traffic around a failure. The NAS servers and Melio FS are managed through the Windows console, and the consolidated storage is normally configured through the vendor's device manager.

The Melio FS/Windows solution scales in an incremental, building-block fashion. Adding NAS servers increases performance in terms of bandwidth and IOPS. Adding to the consolidated SAN storage increases capacity. Performance and capacity scale independently to eight (and more) servers and a virtually unlimited amount of storage. High availability is achieved on the front end through load balancing and failover. On the back end, redundant connections to storage and the smart use of replication and backup software can help ensure continuous data availability.

The price of a Melio FS/Windows NAS solution varies, based on the components used. There is a wide spectrum of prices for storage and SAN equipment, depending on the resiliency, performance, and capacity required. If existing assets are leveraged, the incremental asset cost could be zero. Windows NAS servers are priced competitively, regardless of where purchased. The retail price of Melio is \$4,500 per server. **If you add it up and compare it to a mainstream high-end solution, Melio would be a fraction of the price and potentially hundreds of thousands of dollars less.**

Benefits Across the Spectrum

As mentioned, **the Melio FS/Windows NAS solution is suitable for large-scale deployment because it delivers high-end benefits like scalability, redundancy and failover, and a degree of centralized management.** But it also has benefits associated with the entry-level category. It can start small, with even a single server and storage array, and scale up in a modular fashion by adding servers and storage capacity. (Both

Melio File System

Melio FS is a symmetrical distributed file system for SAN environments. It allows multiple servers to concurrently read and write to a common file system and storage pool over a Fibre Channel or iSCSI SAN. Client servers run the Melio FS software, which appears to the operating system as a local file system. Unlike other technologies in this category, no out-of-band metadata server is required. Instead, the client servers negotiate locking and caching among themselves (symmetrically), and metadata is stored in the common storage pool.

Melio FS's locking is granular enough that different servers can write to the same file simultaneously as long as it is to different byte locations. It also has a journaling capability, so recovery can occur in minutes without taking the volume offline, if a client server fails in mid-operation. It is designed to support heterogeneous servers, including Windows and Unix. Windows is available today, and other operating systems are in development. The size of the file system is effectively unlimited due to its 64-bit architecture. Melio FS is a next-generation file system with a variety of valuable applications.

tasks are non-disruptive to the file system.) This lessens upfront cost without sacrificing ease of scalability. Windows NAS servers are also very inexpensive building blocks, and IT administrators benefit from the familiar Windows console for management.

There are also NAS gateway benefits. Customers have the flexibility to choose their storage platform and data and storage management software. The Melio FS supports tiered storage classes⁵ by striping across different RAID groups or even multiple storage arrays with different price/performance characteristics. Admini-

⁵ See *Tiered Storage Classes Save Money – Getting The Most Out Of Your Storage Infrastructure* in **The Clipper Group Explorer** dated August 29, 2002, at <http://www.clipper.com/research/TCG2002030.pdf>.

strators can then partition the file system and map directories to the appropriate tier, based on business requirements, to strike the optimal between service levels and cost. Gateways also facilitate SAN/NAS convergence and magnify the economic and administrative benefits of consolidation by unifying all block-level storage.

Finally, **the Melio FS/Windows solution offers benefits unique to a distributed file system – namely a global namespace that is accessible from all NAS servers simultaneously. In contrast, most NAS solutions are fragmented into multiple, discrete file systems and namespaces that reside behind particular NAS servers. This can be true even with high-end systems.** Over time, normal use results in an uneven distribution of files and access activity. Some file systems become over-utilized and others underutilized. Some NAS servers are overwhelmed with traffic and others sit idle. Administrators must periodically move files to rebalance utilization and performance – a time-consuming and potentially disruptive process. It may also require remapping shares on hundreds or thousands of user computers and application servers. All of this goes away with a distributed file system architecture.

The bottom line is that the Melio FS/Windows combination can deliver high-end features with significantly lower acquisition and management costs than alternatives. It stakes out a best-of-all-worlds approach by overcoming demarcations and tradeoffs among entry-level, high-end, and gateway NAS solutions.

Integration

If there is a catch here, it is that the onus is on enterprise to integrate the Melio FS/Windows solution. It is not (yet) an out-of-the-box solution or comprehensive service offering. So, if you have the technical skills, or are willing to enlist third-party professional services, then you could create a high-end NAS solution at a fraction of the normal cost. It would involve setting up a small Windows SAN, or directly connecting the

Windows NAS servers to a storage array with enough host ports. Installing the Melio FS is relatively trivial, and Sanbolic can provide guidance. Windows Storage Server 2003 is currently available through OEMs only, so be sure the vendor is willing to sell the standalone server without disk.

Conclusion

If you have large-scale NAS requirements and are willing to make the integration, consider Sanbolic's Melio FS/Windows solution. Its low cost and eclectic combination of high-end, entry-level, and gateway NAS characteristics make it a truly unique offering. It is high end without the high cost.



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