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Published Since 1993 Report #TCG2006051 June 23, 2006

Dell Expands Storage Portfolio — Provides Choice for All Tiers

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Management Summary

Every day, we are forced to make choices. Some of these choices are insignificant: *Do I order decaf or an espresso? Do I order vanilla ice cream or rocky road?* The choices may be many and the outcome may be an impulse decision. Other personal choices, however, are more significant and require a lot of thought. When we look for a new car, for example, do we go with performance and purchase a sleek two-seater or do we opt for room for the family? Do we select an 8-cylinder gas-guzzler or go with the hybrid? Performance, capacity, and economy are just some of the factors that influence our decision. We can never get everything that we want. Finding a trusted dealer who offers a variety of models is important. Money is always a factor.

In the office, our decisions take on more significance and the factors that influence our decisions are more definable. Take the data center, for example. Information Technology (IT) is constantly evolving to meet the demands of a changing enterprise. Many businesses have installed web portals so that customers and partners can have instant access to a web site for queries and for transactions, such as order entry and invoicing. The database must be constantly available, meaning you need the **highest levels of reliability and response** from your transaction server and storage. New enterprise requirements and government rules have also caused an **increase in the size of that database** *and* in the number of devices that make up the storage architecture. The data center needs to **simplify** the storage complexity. Together, a requirement for high reliability, superior response time, *and* high capacity typically have a high acquisition cost and a high total-cost-of-ownership (TCO), perhaps more than the data center budget can handle. Normally, the CIO would have to make a choice between capacity and performance, reliability, and cost containment, in order to meet budget constraints. He can't have it all, or can he?

Fortunately, for the CIOs of all enterprises, recent developments in data center infrastructure have enabled vendors (with a commitment to R&D) and a desire to foresee tomorrow's needs today, to develop solutions that meet the highest levels of capacity, reliability, *and* performance while keeping costs under control. Dell is one of those companies. With their recent announcements of the availability of a low-cost SAS disk subsystem in an expanded high performance array, Dell is making external DAS storage more powerful by pushing higher-level functionality (capacity, expandability, and performance) further down into their portfolio. To learn more about the Dell *PowerVault MD1000 Modular Disk Storage Array*, please read on.

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Storage Cost Containment

The never-ending expansion of information storage requirements in the data center continues to place an undue burden on the CIO of every enterprise, Fortune 500 and SME (small-medium enterprise), alike, as he or she tries to meet the *mission-critical* demands of their enterprise, while, at the same time, adhering to budget constraints. Industry and government regulations require the preservation of an increasing store of historical email and financial data that previously were merely a nuisance, but now are required to keep the executive team out of trouble and out of jail. This *business-critical* data must remain available, placing a strain upon capacity, but without the same availability, throughput, and functionality requirements as the mission-critical databases that are the lifeblood of any enterprise.

Mission-critical information usually is found on high-performance arrays because it must be available instantly to respond to the queries of everyone from corporate executives to customers and partners, from factory personnel to order-entry clerks. Enterprise databases have to be accessible, 24x7, to place orders and process invoices. System outages are simply unacceptable when the enterprise measures downtime in thousands of dollars rather than minutes and hours. Backup and recovery data has similar urgency, although, as the information ages, it carries less significance to the everyday data center operation. It can usually be stored on high-capacity drives with slightly less performance capability. Archived information is another category. It must be saved and managed, but is rarely accessed. For this third-tier data, tape libraries often prove to be the price/performance leader.

Typically, the enterprise data center can establish service policies to manage these different tiers of data in a storage-centric environment. It can assign storage to a specific array in an appropriate tier, according to the value of the data being stored. This necessitates a heterogeneous infrastructure of storage components in order to reduce the TCO of the IT environment. Unfortunately, this can also contribute to increasing the complexity of an already convoluted architecture when the enterprise obtains storage from different vendors, with different management protocols, in order to satisfy data center needs. Simplification requires the implementation of a consolidated storage environment in order to streamline the operation and management processes. Ideally, the enterprise data center will consolidate all of its storage requirements on a storage area network (SAN) and connect this single pool of storage to all of the networked servers. Fortunately, the SME does not have the same complexity requirement as the larger enterprise. **The SME is concerned about a limited number of hosts in its server-centric environment**. The SME, however, still has the same issues as his big brothers: capacity versus performance versus cost, and application and location dependence. The SME needs to be able to identify a single source for all its storage needs, whether high performance or high capacity.

Dell is just that kind of supplier, with storage solutions for every IT environment. With a recent flurry of announcements, Dell has refreshed their partner offering from EMC with new announcements for the storage-centric SAN enterprise from the *AX* and *CX* families. In addition, Dell has introduced a new homegrown array for the server-centric data center that addresses the latest technology innovation, Serial Attached SCSI (SAS)[1], to improve the performance of direct-attached storage and complements networked storage.

What is Serial Attached SCSI?

SAS is follow-on to Ultra320 (parallel) SCSI. It provides a new point-to-point serial protocol for enterprise disk drives, while leveraging the enterprise capabilities of the established SCSI command set. SAS enables multiple tiers of information lifecycle management (ILM) through support for high-performance 10K rpm and 15K rpm, 2.5" and 3.5" SAS drives to support mainstream data warehousing and OLTP applications. It should be noted that 2.5" SAS drives are currently limited to 73GB capacity and 10K RPM. This may not provide the capacity and price/performance required in many business-critical and mission-critical applications. SAS does enable, however, coexistence with low-cost, high-capacity SATA II drives, currently up to 500GB, on the same controller and backplane.

SAS drives maintain a reliability level and pricing structure similar to that of the older U320 drives and are installable within a commodity server or externally, in a rack-mountable JBOD[2] chassis. These JBOD drawers may be daisy chained for greater expandability. While U320 limits SCSI connection to 15 drives, SAS permits thousands of target drives on a host connection. This scalability is complemented by point-to-point connections using PCI-Express architecture for a scalable, dedicated bandwidth, compared to the fixed, shared bandwidth of parallel SCSI. Throughput of 3Gbps is currently available, with up to 12Gbps planned.

Dell PowerVault MD1000

Dell has had a variety of direct-attached disk arrays for the server-centric data center, both homegrown in their UltraSCSI 320 *PowerVault* 220S series, and partnered with EMC. The data center can directly attach the Dell/EMC *AX100/100i* and the new Dell/EMC *AX150/150i*[3] in addition to SAN connectivity. Dell has now expanded this direct-attach offering with a new SAS array, the *PowerVault MD1000*.

The PowerVault MD1000, designed and developed by Dell, tested and certified by Dell, is the first SAS

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[1] See **The Clipper Group Explorer** dated January 4, 2006, entitled *Breaking the I/O Paradigm – SAS Enters the Nearline Storage Race*, at http://www.clipper.com/research/TCG2006002.pdf.

[2] Just a Bunch of Disks.

[3] See **The Clipper Group Navigator** dated May 26, 2006, entitled *EMC Enhances SME Storage – Plus a Big Boost for the Larger Enterp6rise*, available at http://www.clipper.com/research/TCG2006043.pdf.

offering from Dell, and one of the first such products available from any vendor for the server-centric environment. With SAS on PCI-Express providing a throughput improvement of *4X* over UltraSCSI 320 on PCI-X, the MD1000 delivers 1.2 Gbps of full-duplex I/O performance, satisfying the requirements of both mainstream and high-performance computing applications. Compatibility with Serial ATA II (SATA II) drives on the same backplane will enable tiered storage within an array to support audio/video streaming and disk-based backup and recovery on low cost SATA II drives while providing mission-critical database activity on high-performance SAS drives at 10K & 15K RPM[4]. The lower cost of SATA II provides economies of scale for those environments to lower the TCO for the data center. With a new *PowerEdge Expandable Raid Controller* (*PERC5/E*) based upon SAS technology and the availability of PCI-Express slots in the *PowerEdge* hosts, the data center can be sure of reliable, multi-tier access to all of the enterprise data without the necessity of expensive professional services to assist your data center personnel. The MD1000 effectively replaces the PowerVault 220S.

The PERC5/E controller provides multi-level RAID protection to the expanded array through RAID 0, 1, 5, 10, and 50. In addition, it offers data integrity and availability features such as proactive error detection and correction. This controller includes the Dell *OpenManage Server Administrator*. OpenManage provides a complete set of disk configuration and administration utilities for both internal and external PowerEdge disk drives, to simplify the administrative process.

Configured as a 3U rack-mountable JBOD chassis with a minimum of two drives, the MD1000 can support (15) 3.5" SAS devices in the primary enclosure. With the addition of two disk storage enclosures, the MD1000 can daisy chain up to 45 drives on a single host connection, for under $3.5K/TB. Using 300GB 10K rpm SAS drives, an MD1000 will support up to 13.5TB on a single PERC connection. With 500 GB SATA II drives, the MD1000 will be able to support 22.5TB on one host connection. A single MD1000 can also support two separate PowerEdge hosts through the installation of a second *Enclosure Management Module* (*EMM*), with eight drives dedicated to one server and seven drives to the other, sharing the physical infrastructure, lowering the infrastructure TCO.

The EMM[5] monitors and controls the enclosure environment for temperature, fan and power supply status, etc., controls access to the drives, and notifies the server of any change in status. The EMM also manages a complete set of LEDs to assist the data center staff in recognizing a failed component that needs to be replaced. The MD1000 helps to ensure the access to enterprise data with high availability features such as hot swappable disk drives and redundant and hot-swappable power supplies and cooling fan modules.

The MD1000 comes with Dell's standard one-year limited warranty with next business day on-site labor and parts replacement. Dell also provides 7x24-lifetime telephone technical support for troubleshooting and diagnosis, along with e-support services featuring extensive online support capabilities. In addition, Dell offers IT infrastructure services to provide assessment, design, and implementation services to those enterprises requiring assistance.

Conclusion

There is an abundance of storage solutions for the enterprise data center that populates the IT landscape. The enterprise that needs to consolidate tens or hundreds of terabytes into a single resource pool has a variety of SAN and NAS solutions from which to choose. The SME is not so lucky. He does not have $100K to throw at an IT storage problem and, now, doesn't need to.

Fortunately, Dell has introduced a low-cost, high performance DAS solution that can start very small and grow with you. There is no need to guess if you will need high-capacity drives or high-performance ones tomorrow. You can add the right storage when the application requirement is there. There is no need to add the complexity of a storage-centric architecture with the high costs normally associated with a Fibre Channel SAN. With SAS, the data center can install tomorrow's technology while preserving the investment made in existing applications and personnel. There is no need to hire a SAN administrator. The server staff has the SCSI knowledge that SAS relies upon.

Dell designed and tested the PowerVault MD1000 to be easy to install with PowerEdge servers. They optimized them for performance and reliability so that the data center would not have to. SAS provides the MD1000 with unparalleled flexibility, scalability, and performance, so that your IT staff can match the value of enterprise data with the cost of storage, reducing the TCO of the IT infrastructure. The scalability of SAS, especially in the MD1000, enables the fine-tuning of mission-critical applications, enabling even the smallest enterprises to be more responsive to their customers and partners. Further, while parallel SCSI is going to end-of-life, SAS is in its infancy, providing your enterprise with investment protection far into the future.

If you are one of the many SMEs with less than ten servers in your data center, with applications where capacity, performance, and cost are more important than availability, utilization, and advanced software functionality, then Dell's MD1000 may be the ideal solution for your enterprise to deploy storage - when and where it is needed.

[4] 10K drives are available with 73, 146, and 300GB capacities. 15K drives are available with 36, 73, and 146GB capacities.

[5] A second, optional, EMM communicates with a second host.

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