Independent Assessment
by Alan Radding

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Raising the High End of Enterprise Storage
Enterprise storage vendors push the limits

The past year has seen the spectacular rise of midrange storage systems. These systems, modular in nature, have improved dramatically in terms of capacity, performance, and functionality and are directly challenging the traditional enterprise storage systems at the high end.

This phenomenon has not been lost on the enterprise storage leaders. In Oct. 2001 IBM introduced its TotalStorage FAStT, which represents a versatile and scalable family of storage solutions for workgroup, departmental, and even enterprise environments in many cases. Similarly, EMC introduced its midrange CLARiiON CX line of products in the summer of 2002 to capitalize on the growing demand for scalable midrange storage with enterprise capabilities. Hitachi Data Systems (HDS) also offers a midrange line, represented by the Thunder 9200.

With even the premier enterprise storage vendors moving aggressively into the midrange storage market, an obvious question arose: what is the future of high-end enterprise storage? For many organizations, the modular midrange offerings, scaling to tens of terabytes today and boasting features and management capabilities to rival their high-end cousins, appear ready to handle their most demanding tasks. To some the high-end storage solutions look more and more like dinosaurs being driven to extinction by the increasingly capable and less expensive midrange offerings from the very same vendors.

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Early this year, however, the dinosaurs struck back as the leading vendors announced major overhauls of their flagship enterprise storage offerings. Clearly the vendors have no intention of allowing their high-end products to be swept aside by the midrange offerings. But rather than constrain the midrange, they are enhancing the high end. In effect, they are raising the ceiling on high end.

IBM, for example, adopted the Storage Networking Industry Association's (SNIA) Bluefin multi-vendor storage management specification to its Enterprise Storage Server (ESS, formerly codenamed Shark). The company also is further opening its mainframe storage to Linux. IBM will now equip organizations running Linux on zSeries and S/390 mainframes with FICON capability for increased throughput, FlashCopy support for copying data, and Peer-to-Peer Remote Copy capability for disaster recovery. In terms of performance, IBM added 15,000 RPM, 72.8GB disk drives, which will boost disk drive performance up to 50 percent. It also is building its autonomic computing capabilities, such as auto configuration, capacity upgrade on demand, and CIM-enabled monitoring, into all its ESS products.

With storage management one of the most pressing issues facing enterprise storage groups today, IBM's Bluefin endorsement is particularly encouraging. Bluefin, also known as the Storage Management Initiative Specification (SMIS), is intended to solve the problem of multi-vendor storage management. It will only work, however, if major vendors get behind it and build it into their products. IBM is doing just that by providing a Bluefin ESS API. Through the Bluefin interface, storage users and vendors can use a single standard to develop multi-vendor storage management applications. IBM's initial release of the Bluefin ESS API is available for the AIX, Linux, and Windows 2000 operating environments and supports routine LUN management tasks.

Maybe more importantly, IBM also announced that several key independent storage management software vendors are supporting its Bluefin ESS API and are ready to demonstrate working products. These vendors include Computer Associates, BMC Software, InterSAN, McDATA, Tivoli Software, and

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VERITAS. As noted above, this kind of vendor buy-in is critical if multi-vendor storage management is to ever work.

Where IBM is opening its enterprise storage offerings through Linux and Bluefin, EMC is taking a different approach. It is expanding the storage capacity and overall scalability of its high end Symmetric product line. The new top of the line is the Symmetrix DMX series built around a patented architecture, Direct Matrix. The new product will handle bigger workloads with better performance and be able to consolidate more storage in a single system. The top-of-the-line model, a dual-bay integrated system, scales from 8 to 96 front-end ports, supports 7 to 42 TB of raw capacity (6.1-37 TB usable), and offers 8 to 128 GB of global cache for mainframe and open systems environments.

EMC avoids the traditional switch- and bus-based architectures generally used in high-end storage. Instead it uses a point-to-point matrix interconnect consisting of up to 128 point-to-point connections directly linking each of the front-end channel directors to every region of global cache memory, as well as linking every region of global cache memory directly to each back-end disk director. Each dedicated connection is capable of transporting data at 500 megabytes per second, resulting in a total data path bandwidth of 64 gigabytes per second and total aggregate data path and messaging bandwidth of 72 gigabytes per second. This approach resolves performance issues around contention, latency and bandwidth constraints and enables the system to scale in linear fashion.

Behind this architecture is EMC's Enginuity operating environment, a 6.4-gigabyte-per-second, high-bandwidth, low-latency interconnect that manages data movement throughout the Direct Matrix Architecture. The new products also boast immediate backward compatibility with existing Symmetrix systems and software.

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Along the same lines as EMC, HDS enhanced the capacity, connectivity, and throughput options for the Hitachi Freedom Storage Lightning 9900 V Series high-end RAID systems. For example, it supports the new 146 GB drives, which effectively doubles the total raw capacity of the original Lightning 9900 V series to 148 TB (total usable capacity of 128 TB) in a RAID-5 configuration, according to published specifications. It also boosted connectivity through up to 32 FICON channels and 64 Fibre Channel connections at 2Gb per second. In addition, HDS enhanced its Hi-Star crossbar switch-based architecture. Like EMC, HDS has, essentially, pushed its high end even higher. Finally, it introduced a new approach to virtualization that makes 32 physical ports look like 4096 virtual ports able to support heterogeneous servers on the same physical port while giving each its own LUN protection and even its own LUN 0.

I never subscribed to the mainframe-is-doomed theory. (To the contrary, the mainframe is enjoying a revival fueled by a series of enhancements from IBM—the subject of an upcoming Independent Assessment.) Similarly, despite the substantial capacity, performance, and feature improvements in the latest modular midrange storage, it is premature to declare high-end enterprise storage doomed either. To the contrary, the latest revs of their high-end storage offerings suggest the leading enterprise storage vendors are positioning their high-end storage solutions for a long and useful life in today's multi-vendor, open systems storage environment.

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