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WHITE PAPER

Consolidating Enterprise Data with the StorageTek SL8500

Sponsored by: StorageTek

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Executive Summary

Enterprise IT organizations are weighing the opportunities to gain management efficiency, improve utilization, and lower cost by consolidating storage systems. Many enterprises are evaluating plans to better manage distributed storage — disk as well as tape — through the use of high-capacity, high-performance systems. For larger enterprises, a robust tape library will be a part of the consolidated storage environment. IDC believes that tape remains a critical component in a large company's information life-cycle management (ILM) infrastructure.

StorageTek designed the StreamLine™ SL8500 modular library system to fulfill the needs of enterprise-class consolidated storage. The SL8500 can be attached to multiple servers and mainframes with different operating systems — a common requirement when consolidation brings together mainframe and open-systems environments, such as Unix, Linux, and Windows systems. The SL8500 can support multiple tape technologies and manage the separate applications in a single tape library rather than having multiple, distributed libraries.

IDC believes that customers who are consolidating tape storage will need tape libraries that support multiple tape technologies and operating environments. Other key requirements include scalability, non-disruptive operations and maintenance, and virtualization capability. The virtualization of tape allows customers to improve performance and realize better utilization of physical tape cartridges by integrating software and disk to automate and simplify tape storage operations. By optimizing the management of their existing tape resources, enterprises can reduce the cost of operations.

IDC spoke with StorageTek customers who have put the SL8500 system into operation. These respondents told us why they decided to use the SL8500 library system and also reported on the status of their consolidation projects. For one respondent, scalability was a major requirement; for another respondent, support for multiple operating environments was most important.

The StreamLine SL8500 modular library system is StorageTek's first major refresh of its enterprise-class tape library systems. Building on its expertise in the large-scale tape library market by introducing the SL8500 with current and next-generation tape technologies in multiple operating environments and support for virtualization, StorageTek has brought to market a system that is designed to be the central hub in a typical multivendor enterprise IT architecture.

Storage Environments in Today's Enterprises

Cost-effective, centrally managed storage environments are critical business systems for today's enterprise. IT organizations are aiming to provide sufficient, reliable, and scalable storage to support business processes, business continuity plans, and to meet regulatory requirements. Still, while faced with the need for greater storage capacity and increasingly stringent requirements to support business continuity, IT organizations want storage services to consume as small a budget as possible.

Case 1: Consolidation at a European National Security Agency

IDC spoke with the IT director for a European national police agency. Prior to installing a StreamLine SL8500, the agency managed distributed IT systems, including tape storage systems, at multiple locations across the country. In an effort to reduce the high cost of maintenance, the IT organization proposed to consolidate all IT operations to a single datacenter.

The agency evaluated tape library options and selected an entry-level configuration of the SL8500 tape library. The SL8500 that was deployed could accommodate 1,500 tape cartridges and has four StorageTek 9840C tape drives. The library was put into operation in early 2005 and is used primarily for backup and restore procedures. The agency was able to use the SL8500 for both open system and mainframe server environments.

According to the IT director, the StreamLine SL8500 provides his IT organization with two major features: flexibility when supporting a mix of operating environments and scalability as the storage needs of the agency grow. The primary objectives — to reduce the cost of maintenance and consolidate distributed operations — have not yet been achieved. Currently, while the agency's new datacenter is up and running, the IT department has not yet closed out its distributed operations. While the IT director is confident that cost savings will accrue, those savings remain on the horizon at this time.

To achieve these business goals and service levels, IT organizations are attacking the costs of operations and maintenance, which have increased over the years as storage systems have been distributed in scale-out server architectures. While the incremental cost of adding a volume server with onboard storage to the server farm is low, the accumulated costs of managing distributed storage and protecting data stored in a multitude of locations have grown sharply.

Even as the number of IT systems continues to proliferate in support of new applications and business requirements, IT organizations are also consolidating their storage systems to reduce operational costs and maintenance and improve overall

storage system resilience. For both disk and tape storage, IT organizations are migrating to centralized, networked high-capacity storage devices. When storage systems are consolidated, predictable benefits accrue.

- Vast amounts of storage can be managed with fewer operators, using consoles that provide a real-time view of storage system operations and by using scripting tools and rule-based languages to automate repetitive storage decisions and actions.

- Both disk and tape resources can be better utilized when shared. When storage systems are widely distributed and difficult to upgrade, resources are often over-provisioned to guarantee that capacity is available, and over-provisioning of storage resources will lead to underutilization.

- Consolidated and tiered storage systems enable datacenter managers to better match data requirements to appropriate storage resources. For example, less demanding workloads can be assigned lower performance disk resources. Data that are not being actively accessed can be migrated to near-line and offline storage.

- Business continuity plans can be simpler when storage systems are consolidated. The hardware that supports consolidated storage is designed with greater resilience and fault tolerance (i.e., redundant components that can be replaced without interrupting operations). In enterprises with multiple data centers, consolidated storage systems can be designed to replicate data intelligently so that a remote datacenter can take over operations if the primary datacenter is unavailable.

- In some industries, compliance requirements are driving the need for consolidated storage. Critical information needs to be stored securely, privacy and data recovery policies must be made explicit, documented, and enforceable, and retrieval of key information must be accomplished in a timely fashion. Search and discovery are critical for compliance requirements and favor an efficient, centralized storage system — ideally the same system that provides the corporate data protection.

Consolidating Tape Storage

Two key technologies needed to consolidate tape storage are high-performance, high-capacity robotic tape libraries and integrated disk/tape systems that provide virtual tape capability.

- Robotic tape libraries are necessary to manage the thousands of cartridges that make up a consolidated storage system and to house the tape drives that read and write data. Sophisticated libraries are able to support and manage multiple tape technologies and associated tape cartridges. Customers can partition the tape library to use a user-defined tape technology for an application or to migrate data from one tape technology to another inside the same library.

- Virtual tape systems utilize disk buffering to improve the overall performance, increase reliability and fault tolerance of a tape library. Data sets are written to virtual drives and initially stored on disk. Policy-based software allows storage managers to formulate data sets into logical groupings to be written to physical tape cartridges for export or archive.

Case 2: Storage Technology Refresh at a Distribution Company

IDC spoke with the datacenter manager for a large distribution company. Eighteen months ago, the company recognized that it had outgrown its tape storage systems, which comprised StorageTek silo managing 3490 tape cartridges supporting mainframe systems and a separate set of tape drives using DLT4 cartridges dedicated to support for open systems. The 12-drive silo was at its limit, and operators were spending increasing amounts of time ejecting and rotating cartridges into the silo to maintain required capacity.

In place of this legacy system, the organization deployed a StorageTek StreamLine SL8500 configured to manage 1440 cartridges. Two 9840c drives were installed to support open system applications and seven 9840a drives were installed in support of mainframe operations. Of the seven 9840a drives, three were directly attached to mainframe servers for volume dumps and four were assigned a StorageTek Virtual Storage Manager (VSM) for dataset stacking.

The datacenter manager identified a number of benefits attributed to the new system. Media costs were cut dramatically due to the use of newer high-capacity cartridges that are highly utilized due to well-planned usage supported by the VSM. Rather than 10,000 cartridges, the organization was able to manage its extensive datasets with 250 cartridges.

The VSM also provided day-to-day scratch storage without the use of the tape medium, which led to further media and vaulting cost savings.

Unifying all tape storage in a single automated library helped the IT organization to provide better service to non-mainframe workloads, which include an information warehouse and extensive Microsoft Exchange and SQL server applications.

In two days, the new storage systems were up and running and in two weeks, integration was completed. StorageTek provided the company with a detailed project plan for the conversion effort and also offered onsite consulting help to integrate the new VSM into the datacenter's operations.

Evaluating Tape Storage Solutions

When investigating new large-scale, enterprise-class tape storage solutions, IDC recommends that IT organizations keep the following criteria in mind:

- **Scalability.** Tape storage libraries can grow with the organization's storage requirements.
  - The ability to purchase only needed capacity and then to add more tape drives and tape cartridges to a tape library *on demand* is an important feature for IT departments that want to invest incrementally as enterprise needs grow.
- **Support of multiple tape technologies.** The ability to integrate multiple tape drives inside the library to host several different applications and workloads adds valuable flexibility to the system.
  - Tape libraries that can be logically partitioned to readily accommodate new drives and cartridges alongside the existing drives and cartridges will better support the inevitable migration to new tape technologies.
- **Non-disruptive operations and maintenance.** The library needs to be capable of continuous availability while robotics, drives, power supplies, and other components are serviced or replaced.
  - Continuous availability depends on more than simple redundancy and fail-over to protect against component failure. The library must be designed to allow service providers to remove and replace components without the need to take the system offline.
- **Virtualization capabilities.** Virtualization automates storage management functions such as data migration and relieves system managers from manual intervention.
  - Tape virtualization integrates disks on the front end as a buffer for the physical tape drives inside the library. Virtual tape volumes can be more efficiently managed and stacked for better capacity utilization before data is migrated to physical tape cartridges.
  - Tape virtualization improves backup reliability and performance. In addition, virtualization improves tape drive and cartridge utilization, thereby reducing the number of drives and cartridges required.
  - Other virtualization services include rule-based and scripting languages for expressing data-management policies and procedures — all critical components of ILM.

The StreamLine SL8500 Modular Library System

StorageTek is a provider of tape and disk products with a focus on providing customers with tiered storage solutions and information life-cycle management (ILM) infrastructure. The fundamental concept of ILM is that an organization's requirements for storing and retrieving data sets vary, depending on the criticality and age of its data, as well as business rules and application requirements. StorageTek, having both disk storage systems and large-scale tape libraries, aims to provide not only the necessary components for customers to implement ILM but the complete end-to-end solutions.

The SL8500 library system, which began shipping in June of 2004, is StorageTek's first complete redesign of the company's enterprise-class tape library since the introduction of 4410 in 1987, which was renamed the 9310 in 1993. StorageTek positions the SL8500 as a platform for storage consolidation and the foundation for an enterprise business continuity plan. The following features and functions characterize the StreamLine SL8500:

- **Heterogeneous attachment.** One SL8500 can be shared by supercomputers, mainframes, AS/400, and various versions of Unix, Linux, and NT. The library can be logically shared so that no hard partitions are required, even if the library is shared by different backup software applications.

- **Scalability.** The minimum configuration for the SL8500 is 1,448 customer-usable tape cartridge slots. Using pass-through, the SL8500 system can be expanded to a maximum configuration of over 300,000 slots, with 32 SL8500 library systems operating together.

- **Capacity.** If 32 SL8500 library systems were integrated and populated with LTO Gen 3 cartridges, the total storage capacity of the automated tape library would be 120PB. The maximum number of drives is 2,048.

- **Flexibility.** Tape drives may be any combination of T9840 ESCON, Fibre Channel and FICON; T9940 ESCON, Fibre Channel, and FICON; LTO Ultrium Fibre Channel; and SDLT Fibre Channel. Each slot can contain any of the different types of cartridges, so any combination of mixed media is supported. The SL8500 will support future StorageTek, LTO and SDLT tape technologies as these product road maps evolve.

- **Availability.** Drives, power supplies, and robots can be provisioned with redundancy and can be replaced without interrupting operations. Moreover, the SL8500 can be scaled to greater capacity by adding drives, slots, robots, and libraries without bringing library operations to a halt.

- **Compact.** Compared to StorageTek's previous enterprise automated tape libraries, the StreamLine SL8500 has higher slot density, which leads to a smaller footprint in the datacenter for the same amount of storage capacity.

- **Efficient management.** When populated with StorageTek T9940 and T9840 tape drives, the StreamLine SL8500 integrates with StorageTek's Virtual Storage Manager (VSM), which is a virtual tape system that provides disk for buffering data and virtualization software for better performance and more efficient tape volume management. Note that some T9940 and T9840 drives in an SL8500 library system can be allocated to a VSM while other drives can be allocated to non-VSM tape workloads.

In summary, the StreamLine SL8500 will be the primary high-end automated tape library offering for StorageTek in the months and years ahead. StorageTek has aimed to satisfy as many enterprise requirements as possible with a library that scales, accepts both new and legacy tape cartridges, and is engineered to meet rigorous availability levels.

Case 3: Consolidation at a Global Logistics Company

IDC spoke with the IT director for a global logistics company. In December of 2004, a StreamLine SL8500 tape library was installed at the company's primary datacenter. The primary objectives for the new tape library were to consolidate tape storage across all operating environments, to accommodate new tape technologies, and to reduce the cost of ongoing operations.

The SL8500 library was configured with 1,500 slots and 16 tape drives. Eight of the tape drives support mainframe operations and use StorageTek's 9840C tape drives. Six LTO-2 drives support Unix or open-system operating environments and two additional LTO-2 drives support AS/400 servers.

The SL8500 allowed the company to deploy multiple higher-capacity tape technologies inside the same library to be centrally managed. Prior to deploying the SL8500, the IT organization shipped from 800 to 1,000 tape cartridges to offsite storage each week. Now, with the SL8500 with 9840C and LTO-2 tape drives, the weekly count has been reduced to 13 cartridges and the daily backup is a single cartridge. The SL8500, with new higher-capacity tape technologies, resulted in significant cost savings for the company's IT personnel and fees for offsite storage of tape cartridges. In the IT manager's words, "We experienced a hefty reduction in offsite storage fees."

Migrating mainframe servers to the SL8500 was challenging since these environments have been well served in the past, and some conventions and tools needed to change. According to the IT manager, migrating open-system environments to the SL8500 was much less challenging, in part because this community of users is less demanding and more familiar with system software changes. Migrating the AS-400 community was a more challenging exercise, IDC learned from the IT manager.

IDC Analysis

Opportunities

StorageTek's StreamLine SL8500 demonstrates the company's intention to launch new products that provide improvements in performance, capacity, and density when compared with earlier StorageTek offerings. StorageTek is well positioned to take advantage of customers' need for a tape library platform that will support multiple tape technologies and application needs in a scalable, large-scale, consolidated library. The product's scalability allows StorageTek to sell it to a multitude of customers with more modest tape storage needs as well as to those customers with extraordinary storage needs.

StorageTek's SL8500 is reaching the market just as a new investment cycle is underway. Not only are IT organizations planning to refresh storage infrastructure, they are also designing consolidated architectures and seeking virtualization capabilities to improve utilization and lower management costs. The SL8500, in combination with StorageTek's Virtual Storage Manager, is designed to meet these requirements.

Challenges

StorageTek's competitive challenges come in two forms: direct competition in the marketplace and competition to replace currently installed StorageTek products, namely its 9310 PowderHorn tape library. StorageTek faces formidable competitors that continue to innovate, invest, and update their products. StorageTek is not alone in targeting customers with flexible, scalable tape libraries that can support a multitude of new tape technologies as well as support virtualization.

IDC believes that StorageTek will need to develop a two-pronged strategy: sell the SL8500 to IT organizations beginning consolidation projects and also to 9310 PowderHorn customers who already understand the benefits of consolidation and will evaluate the SL8500 as an extension of StorageTek's product line. StorageTek will need to convince both communities that the SL8500 provides better capacity, performance, and flexibility than its earlier tape libraries and libraries available from competitors.

The greater challenges for StorageTek are organizational inertia within IT departments. IT organizations often don't have staff or time to support migrations and testing of new solutions. They are too busy supporting growth on a day-to-day basis. The fact that it is a new architecture, rather than a refresh, will mean that some customers will want to do substantially more testing. StorageTek needs to develop testing and migration tolls and services that overcome this resistance.

In addition, traditional organizational and reporting structures within companies are major inhibitors to effective consolidation. The decision maker for a backup solution in distributed computing environments is typically very different from the decision maker in classical mainframe and large UNIX environments. They have different processes and often must respond to different customer expectations on performance and costs. StorageTek must work aggressively to sell the benefits of consolidation at higher levels of the organizations through clear explanations of TCO benefits and operational resilience benefits.

Conclusion

StorageTek's SL8500 modular library system represents the first re-architecture of its enterprise-class tape library since the introduction of its 4410 PowderHorn tape library in 1987.

The automated tape library requirements for enterprise storage consolidation are rigorous and demanding. StorageTek's StreamLine SL8500 library system is designed to meet those requirements head on. IDC's research with users of the SL8500 indicates that StorageTek is offering a product that is well suited to the challenges of storage consolidation.