Consolidate Storage Infrastructure and Create a Greener Datacenter

Executive Overview

As data volumes grow and budgets shrink, datacenter managers are looking for ways to scale storage infrastructure and reduce operating costs. StorageTek tape drive and tape library solutions from Oracle provide the answer, helping companies grow automated tape environments without disruption, and consolidate mainframe and open system operating environments while minimizing power, floor space, and operating costs.

Introduction

To stay ahead of rapidly changing business conditions, organizations depend on fast and easy access to the information maintained in their corporate datacenters. However, as data volumes rise, datacenter managers face considerable challenges in meeting that demand. Not only must they find ways to cope with an expanding storage infrastructure, but they must also

- Provide continuous access to data stored on reliable and secure media

- Meet stringent compliance regulations that require longer data retention

- Create operational efficiency while simultaneously cutting costs

Balancing these demands is complex. Fortunately, innovative storage technologies offer new economies of scale to help organization efficiently and effectively consolidate their storage infrastructure and streamline datacenters. Whether companies are looking to lower costs, conserve energy, improve response times, improve performance, increase capacity, or optimize the balance sheet, Oracle can help deliver well-defined and measurable results.

Optimize Storage Resource Efficiency with Consolidation

As data volumes grow, IT organizations add storage systems and new media types to support skyrocketing information loads and to improve performance. The result is a sprawling, complex network of systems that consume valuable datacenter floor space, create excessive power and cooling demands, and are costly and difficult to manage. To maximize efficiency, companies must tier storage between high-cost, energy-inefficient disk drives and lower-cost, energy-efficient, long-term tape archive systems to manage the bottom line. In addition, many installed tape systems don't provide mixed media support, partitioning, or library sharing, making it difficult for datacenters to scale and share hardware and software to leverage existing resources and reduce operational costs. With the right tape storage technology, companies can consolidate multiple smaller systems onto larger solutions (or large systems onto fewer, higher-density solutions) and store more data at less cost.

Proof that Consolidation Works

Consolidation strategies are proving to be important for datacenters looking to handle growing data volumes, streamline datacenter operations, and reduce backup time frames at less cost. Recently, The Swedish National Police Board (NPB) decided to upgrade an aging and decentralized storage network that was becoming increasingly difficult to manage. Adding to the NPB's woes were its growing data storage and access needs, which had begun to strain the storage network. To address these problems, the NPB consolidated four regional storage environments scattered across the country into a single main operating center in Stockholm. By deploying StorageTek SL8500 modular library system in conjunction with some of its existing tape libraries NPB was able to create an efficient storage infrastructure and reduce operational expenses by 75 percent.

Using the StorageTek SL8500 modular library system, the NPB centrally stores images and information from criminal investigations. Police personnel can access these digital images—including video film material—from the scene of a crime, from anywhere in the country. In addition to scalability, the Oracle storage solution has provided an essential consolidation platform. Rather than running separate data backups at each of the four former storage sites, the NPB now runs a single consolidated process at its new Stockholm facility.

Consolidate and Save

When the Swedish National Police Board decided to upgrade its aging and difficult-to-manage decentralized storage network, it adopted Oracle's StorageTek SL8500 modular library system. As a result, the organization

- Consolidated four storage facilities into one
- Saved up to 75 percent in operational expenses
- Managed storage resources efficiently
- Boosted employee productivity
- Leveraged existing storage investments

Refresh the Datacenter with the Latest Tape Storage Technology

Technology refresh cycles are a necessity, helping enterprises consolidate and operate at peak performance. Yet in recent years, tape technology has come to be perceived as outdated, which means that many companies have failed to take advantage of the latest advancements in the technology. For example, fast-access tape technology provides a cost-effective alternative to expensive disk drives for certain applications. Indeed, The Clipper Group estimates that disk drives cost an average of 23 times more than tape solutions for long-term storage and 290 times more than tape drives to power and cool.[1]

Today, Oracle tape drives and library systems offer cost-saving opportunities by providing high-capacity, low-cost media with long shelf lives and significantly lower energy consumption than other storage technologies. Combining nondisruptive, on-demand scalability with enterprise-class reliability, Oracle tape drives and library systems support the massive data growth many organizations are experiencing—without the high cost of disk storage systems when capacity demands rise.

Oracle continues to drive tape technology forward, developing libraries, drives, and media that safeguard data, accelerate access, and reduce the cost of storing and moving data in supercomputer, enterprise mainframe, open systems, or mixed operating environments. Easy to install, scale, manage, and maintain, Oracle's comprehensive portfolio of tape solutions offers a broad range of capacities and performance levels designed to meet the operational and budgetary requirements of virtually any organization (see Figure 1).

Figure 1. Oracle offers a comprehensive tape storage family that scales from individual tape drives to large-scale library systems.

[1]The Clipper Group, *Disk and Tape Square Off Again—Tape Remains King of the Hill with LTO-4,* Report No. TCG2008009, February 13, 2008.

StorageTek SL8500 Modular Library System

The StorageTek SL8500 modular library system provides the foundation that datacenters need to simplify data access strategies and reduce administrative costs.

• **Grow effortlessly.** With a base capacity of 1.4 to 10 PB of near-line storage using 64 tape drives and 1,448 to 10,000 tape cartridges, the StorageTek SL8500 library provides extreme scalability and flexibility. Up to seven library modules can be interconnected and operated as a single system to accommodate up to 448 tape drives and 70,000 tape cartridges and provide up to 70 PB of storage. Offering high capacity in a compact footprint (capacity modules that add 1,728 slots to the system are only 37.5 inches long), the StorageTek SL8500 library is designed to provide virtually limitless storage capacity while allowing growth in easy-to-manage, cost-effective increments.

• **Boost performance.** Each StorageTek SL8500 library is equipped with four or eight HandBot robotics working in parallel to handle multiple asynchronous mount requests, reducing queuing and maintaining peak performance even as capacity is added and workloads increase.

• **Protect investments.** Any cartridge any slot technology allows mixed drive and media types in a single chassis—including StorageTek T10000, StorageTekT9840, StorageTekT9940, StorageTek LTO, StorageTek SDLT, and StorageTek DLT-S4 tape cartridges—without the need to replace slots or add special drive frames to accommodate different technologies.

• **Minimize risk.** Designed to reduce downtime, the StorageTek SL8500 library provides stellar reliability, availability, and serviceability (RAS) capabilities to avoid outages and reduce recovery time. Design features such as hot-swappable drives, power supplies, and robotics; optional redundant robotics; and N+1 or 2N power configurations boost the availability of these library systems.

StorageTek SL3000 Modular Library System

Based on industry-leading StorageTek SL8500 library design innovation, Oracle's midrange StorageTek SL3000 modular library system offers an ecoefficient approach with choice and control for today's changing datacenter environments.

• **Scale to meet demand.** With up to 56 tape drives and nondisruptive scalability to over 3,000 tape slots, the system provides more than 3 PB of capacity in a footprint that grows linearly in a rack environment. Real-time growth capability lets companies install physical capacity in advance and tap into it incrementally with capacity on demand license keys to grow automation environments at the right pace.

• **Consolidate and save.** The innovative and open design of the StorageTek SL3000 library offers any cartridge any slot technology, true mixed media support, logical and physical partitioning capabilities, no restriction sharing, and advanced management so that datacenter managers can consolidate mainframe and open systems environments while minimizing power,

space, and operating costs. For example, these systems offer 20 to 50 percent footprint and power savings over libraries from other vendors.

• **Improve performance.** A unique Centerline architecture, which includes drives located in the middle of the library, alleviates contention. Robots travel one-third to one-half the distance required by other libraries, which can help improve cartridge-to-drive performance by up to 50 percent. In addition, nondisruptive, on-the-fly replacement of robotics, power supplies, and drives helps sustain around-the-clock operations.

Consolidate and Save

By consolidating three IBM systems onto one StorageTek SL3000 modular library system with StorageTek LTO tape drives, companies can

- Reduce power consumption by 66 percent
- Reclaim 85 percent of floor space
- Save more than US$1.4 million in environmental costs over five years
- Save $374,000 in hardware maintenance costs
- Achieve an ROI of 172 percent
- Achieve initial investment payback in 31 months

Innovative Tape Drive Technology

As datacenter managers look for ways to reduce costs and maximize their tape technology investments, finding solutions that keep data secure and provide needed availability without sacrificing performance is paramount. Oracle offers a range of tape drives that work in conjunction with Oracle tape libraries to deliver the capacity, data integrity, reliability, and performance that datacenters depend on to support business goals.

• **StorageTek T9840D tape drives.** StorageTek T9840D tape drives boost productivity by providing fast data access and nearly twice the capacity of previous-generation StorageTek T9840C tape drives—and they do so at a fraction of the cost of disk drives. With dual-hub technology, the drive offers an unparalleled 17-second average access time (including loop and thread time) and 75 GB of native capacity. Providing fourth-generation media reuse and backward read/write compatibility, these tape drives help protect investments in 10 years of media purchases and increase media and data longevity. In addition, dependable enterprise-class reliability features, such as a dual-hub design and robust tape loading assemblies, help the device withstand high duty cycles and around-the-clock enterprise automation in start-stop applications.

• **StorageTek T10000B enterprise tape drives.** These tape drives combine high capacity, reliability, performance, and data security to support 24/7 datacenter operations demanding high-duty-cycle data storage and retrieval. As the first tape drives offering 1 TB capacity, these drives deliver twice the capacity of previous StorageTek T10000 tape drives and more than five times the capacity of StorageTek T9940B tape drives. With 120 MB/sec throughput, a terabyte

of uncompressed information can be written in under 2.5 hours—without a media exchange—to minimize data backup windows. StorageTek T10000B tape drives and media offer durability and dependability. Highly accurate error correction code (ECC) helps ensure data integrity, and improved tape guiding systems (designed to reduce tape speed with fewer tape passes) help to reduce drive and media wear. In addition, second-generation media reuse and backward read/write compatibility help protect existing StorageTek T10000 tape media investments.

StorageTek T9840D, StorageTek T10000B, and StorageTek LTO4 tape drives are encryption-ready and can be mixed and matched in Oracle libraries to meet capacity and access-time demands. Device-level security with the StorageTek Crypto Key Management System helps ensure data protection and limits exposure to damaging litigation for data security breaches. Embedded encryption technology supports regulatory and compliance policies to ensure that only the right people have access to mission-critical data, and Write Once Read Many (WORM) media protects key data from being overwritten.

Centralize and Save

A large European bank deployed a central backup-and-restore system based on Oracle's StorageTek storage systems. As a result, the bank

- Consolidated five older Oracle tape library systems onto one StorageTek SL8500 modular library system
- Reduced backup and restore times by 2 times
- Reduced storage footprint
- Increased storage capacity
- Reduced power costs per unit of storage

Save Energy and Reclaim Datacenter Floor Space

Analysts estimate that more than 80 percent of datacenters are power- and heat-constrained—problems that datacenter managers are working to alleviate even as they add storage capacity. Unfortunately, adding power and cooling capacity to buildings is often expensive. And in some cases, it's simply not possible to do so within the boundaries of existing facilities. The power consumed and heat generated by many older—and even newer—storage technologies can make data capacity an issue even when the datacenter has room for more storage systems. Consolidation and technology refresh often allow for greater capacity in less floor space with reduced power and cooling demands.

Energy- and space-efficient Oracle tape libraries produce far less heat and consume less power than tape technologies from other vendors and than disk storage systems. By reclaiming datacenter floor space with low-power, capacity-dense tape solutions, organizations can reduce real-estate costs and store more information at less cost.

One organization that did just this was the Australian Government Department of Employment and Workplace Relations (DEWR). It needed to increase the capacity of its existing backup

infrastructure to cope with rapid growth in data storage requirements. Anticipating that the Australian Government's Work Choices and Welfare to Work initiatives would increase data volumes, DEWR needed to create capacity in advance.

DEWR's two Canberra-based centers handle the data processing and storage requirements for all of the department's applications. This backup technology ensures that information is available to government and public users 24/7. After considering the available alternatives, DEWR opted to enhance its existing StorageTek mainframe and server tape backup infrastructure with the newest generation of Oracle technology. At each of its data processing sites, DEWR replaced its existing StorageTek Powerhorn 9310 with a StorageTek SL8500 library. Based on the higher performance and increased operating efficiency of the StorageTek SL8500, the upgrade resulted in improved reliability, consolidated cost savings, flexible scalability, reduced floor space, and lower energy requirements.

When the Australian Government Department of Employment and Workplace Relations needed to increase the capacity of its existing backup infrastructure, it opted to use Oracle's StorageTek SL8500. As a result, the department

- Reduced its storage footprint by 33 percent
- Generated approximately 75 percent less heat
- Reduced overall energy requirements by 66 percent
- Protected its investments in existing storage technology

Virtualize for Even Greater Savings

Virtualization serves as an important tiered storage layer as companies look to consolidate redundant and aging infrastructures and create more-agile and cost-effective datacenters. Indeed, storage virtualization technologies can help organizations eliminate redundant data, reduce bandwidth requirements, and better use existing infrastructure to reduce space, power, and cooling requirements.

- **StorageTek Virtual Storage Manager.** StorageTek Virtual Storage Manager provides enhanced disk-to-disk-to-tape functionality to help maximize resource utilization for data protection and archive applications. Full automation, 100 percent utilization of large-capacity cartridges, and the ability to connect systems nondisruptively to grow capacity and boost performance can help reduce total cost of ownership.

- **StorageTek Virtual Tape Library Plus.** Featuring virtual drive and library resources that can be deployed, managed, and monitored from a single point, this system enables small and midsize datacenters to consolidate management and provisioning of backup resources, share tape drives across backup applications, and add workloads without affecting tape configurations. Options ranging from 12 to 896 TB of uncompressed capacity let companies select solutions for today and then upgrade as their needs change.

- **StorageTek Virtual Tape Library Prime.** This integrated virtual tape library and global data deduplication system helps enterprise open systems datacenters reduce storage and replication bandwidth requirements. Integrating with backup software and existing infrastructure, the solution lets multiple backups occur simultaneously. Five configurations enable companies to choose the solution that meets their capacity needs.

Virtualize and Save More

A European convenience store supplier replaced existing backup solutions with a new virtual tape library backup system based on StorageTek technologies. As a result, it

- Reduced SAP retail system backup times from 16 to 6 hours
- Reduced backup times for smaller applications from 30 to 3 minutes
- Reduced database size from 4.2 TB to 950 GB using compression
- Improved failover and data recovery times

Putting It All Together

By consolidating systems onto the latest storage technology, enterprises can substantially reduce operating costs.[2] For example, an IT organization with an existing StorageTek 9310 library system with 15 StorageTek T9940B tape drives and 5,000 media cartridges located in more than 210 square feet of datacenter floor space can consolidate onto a StorageTek SL3000 library system for substantial savings.

By moving data onto one StorageTek SL3000 modular library system with six StorageTek T10000B tape drives and 5,000 media cartridges requiring only 64 square feet of datacenter floor space, the company can reduce hardware costs by US$189,000 and reclaim 70 percent of floor space used by the storage systems. With an initial investment of US$516,000 for the storage systems and professional services implementation consulting, maintenance costs can be reduced by more than US$351,000. Combine these savings with a 70 percent reduction in power, cooling, and carbon dioxide emissions, and the organization can save more than US$389,000 in environmental costs. Delivering an internal rate of return of 57 percent and a return on investment of 231 percent, the refresh and consolidation strategy pays for itself in 26 months.

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[2]Data in this example is provided for informational purposes only and does not represent an Oracle proposal or guarantee of results. Data is calculated with an Oracle tool that illustrates the potential ROI, TCO, and other financial results that customers may achieve by implementing various IT solutions. The results shown are based on application of assumptions to the particular data input. Actual results may vary depending on factors including the accuracy of the assumptions and the data.

Conclusion

An enterprise's data represents one of its most important assets, so how that data is stored, accessed, and secured is of paramount importance. Increasingly, however, datacenter managers find themselves struggling to keep pace with growing storage infrastructure demands while still keeping costs low and data readily available. One solution that has emerged is storage infrastructure consolidation. Providing economies of scale, a sound storage consolidation strategy can lead to lower costs, less energy consumption, improved response times, better performance, increased capacity, and more. Oracle's StorageTek solutions provide effective and efficient opportunities for organizations to consolidate, upgrade, and augment existing storage infrastructure solutions to achieve tangible business results through higher performance and lower operating costs.

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