THE CLIPPER GROUP
Navigator™
Navigating Information Technology Horizons℠
Published Since 1993 Report #TCG2013004 February 24, 2013

Oracle Continues Commitment to Tape — Lowering TCO for Long-Term Storage

Analyst: David Reine

Management Summary

Everyone knows that to do the job, any job, properly, you must have the right tools, and the expertise to know how to use them. Most of us would never think of trying to build our own house or trying to repair our own car. You look for an experienced carpenter to build a house for you or an expert mechanic to fix your automobile. In both cases, you look for the trained professional who can bring the right tools to do the job right the first time, holding waste and costs, down to a minimum, while completing the job in a timely fashion. For the carpenter, this may mean knowing what lumber to use, having the right saws to do the job, with the right nailer and nails, and especially, a good tape measure. (Measure twice, cut once – to reduce waste.) For the mechanic, this could get a little more complicated. With the advent of all new electronics under the hood every year, the right tools and the right training have gotten much more expensive. The mechanic needs specialized training in the use of new diagnostic equipment and software for every car, and a varied supply of parts on-hand, or rapid access to them.

Having the right tools for every job is nothing new for the manager of any enterprise data center, especially when it comes to finding the right place to store multiple tiers of data, each with their own characteristics. The IT staff can choose from solid state disks (SSDs), hard disk drives (HDDs) of varying size, speed, and complexity (Fibre Channel (FC), SAS, or SATA), or even the proverbially old standby – tape – to enable the data center with a high capacity, low cost, flexible and portable media. Obviously, each tier brings a different set of requirements and penalties. The data for mission-critical applications with the highest performance characteristics command the fastest possible access, and also carry the highest acquisition costs, and often is stored on Tier 0 drives, perhaps SSDs. Mission-critical applications with a little less urgency may be satisfied by high-performance Tier 1 HDDs that rotate at the highest speeds, either SAS or SATA. Other business-critical applications, such as backup, can be satisfied by Tier 2 HDDs such as SAS or SATA with slower latency. Any HDD environment, however, is going to carry a higher total cost of ownership (TCO) than a tape environment. The data center, however, that manages an application environment, such as archive, with *write once and read rarely, if ever* characteristics, does not demand the same access urgency and cannot afford the associated higher costs of higher tiers. For these applications, Tier-3 tape drives provide the ideal solution. One company that has a l-o-n-g history of supporting the data center with a wide variety of tape solutions is Oracle (née StorageTek (STK)).

With their most recent announcement, Oracle has introduced LTO-6 tape drives and cartridges to their product set, complementing their enterprise tape family, raising capacity limits for data centers with an open systems requirement, more than doubling their compressed storage capacity from LTO-5. To learn more about how Oracle can reduce the TCO for your data center, please read on.

IN THIS ISSUE

The Long-Term Storage Dilemma

Every data center has been experiencing a period of unprecedented data growth, causing an expansion of the storage facilities required to house it. It doesn't matter whether your data center needs to store ten terabytes of data or ten petabytes; you need a flexible, scalable and reliable system that will enable each tier of your storage to scale to meet the needs of your business. Many data centers have been doubling their storage requirements every 12-to-18 months, while some are experiencing even greater growth, adding to the management complexity and issues involved in accessing data.

This growth is placing a tremendous burden on the IT staff and on the IT budget, as each business attempts to control the TCO of the IT infrastructure. The IT staff not only has to acquire additional primary storage, but they also must provide for the long-term preservation of business- and mission-critical information, as well as other archival data. Some enterprises are looking for a single vendor who can satisfy all of their needs, across all of their tiers of storage, minimizing the pains caused by multiple management strategies as well as multiple ordering paths. Perhaps, the data center can find a single vendor who they can trust to solve all of their data center pains.

Many applications require a backup storage solution that may require a disk-to-disk (D2D) architecture – to expedite the availability of the data in the event that a recovery is needed. In addition, D2D can be used to better manage data center operations, as the amount of data being backed-up often stretches the bounds of the backup window and improves workload performance when a recovery is required. Unfortunately, the IT staff also has to cope with D2D acquisition, maintenance, and licensing costs in addition to the ancillary costs, such as the power required to drive and cool the expanded architecture, the space needed to house the disks, and the additional technology needed to protect the data from unauthorized access. The IT staff needs to satisfy the demands being placed on the data center by the growth of data storage.

However, the challenges of TCO and data protection in a D2D environment can create an unacceptable burden on the IT budget for the long-term preservation of data, whether backups or archives. Preserving this information may demand a lower cost storage target, such as tape[1]**,** which can be used with disk-to-tape (D2T) and disk-to-disk-to-tape (D2D2T) storage environments.

Exhibit 1 — Long-Term Storage Requirements

- **Non-Interference** – Be able to provide sufficiently high performance to meet enterprise workload scheduling requirements;
- **High Capacity** – Be able to meet the storage growth demands of the data center;
- **Affordability** – Be able to live within budget limitations;
- **Reliability** – Be able to ensure uninterrupted data access;
- **Scalability** – Allow the data center to protect its investment with seamless upgrades as capacity grows;
- **Security** – Be able to ensure and protect the integrity of the data and prevent unauthorized access;
- **Energy Efficiency** – Be able to lower the demand on electrical resources and extend the life of the data center, even as backed up and archived data capacity grows;
- **Portability** – Allow the transportation of media offsite to facilitate disaster recovery; and
- **Ease-of-Use** – Do this all while minimizing additional demands being placed upon the IT staff.

***Source**: The Clipper Group*

Many IT organizations have deployed or are looking to deploy an automated tape library with the most current technology in order to reduce the TCO and energy consumption of long-term storage as well as to enable easy to use data management strategies. In fact, with the expanded capacity and improved throughput of the newest tape architectures, some data centers are even looking to adopt, or return to, a more direct D2T solution. See Exhibit 1, above, for the requirements needed to satisfy the needs of storing data over the long term.

[1] For a discussion on lowering TCO by using tape, see the issue of Clipper Notes dated December 20, 2010, entitled *In Search of the Long-Term Archiving Solution – Tape Delivers Significant TCO Advantages over Disk*, and available at http://www.clipper.com/research/TCG2010054.pdf.

The Rationale for Tape

Today's modern data center still needs reliable tape automation, supporting the latest tape technology with the highest capacity and throughput and with the least complexity. **For today's data center with an open systems architecture deployed, this means the deployment of the newest *LTO*[2] Fibre Channel (FC) technology, with the highest open systems capacity and throughput and the lowest total cost of ownership, all while protecting prior investments in LTO media.** The data center with both mainframe and open systems deployed needs a tape library architecture that is flexible enough to connect to both environments.

The open systems data center needs *LTO-6*[3], the newest *Ultrium* drive, to complement or replace older, less performant LTO drives. This will facilitate data preservation within the existing IT budget by enabling the data center to protect previous investments in *Ultrium* LTO tape with the capability to write to *LTO-5*[4] cartridges and read from LTO-5 and *LTO-4* cartridges. With more than twice the compressed capacity of LTO-5 tape, LTO-6 tape enables the data center to reduce the number of cartridges required, reducing the floor space, and prolonging the investment in the tape infrastructure. In addition, with a roadmap that includes *LTO-7* and *LTO-8* technology, the data center staff can plan for even more capacity and performance in less space in the years to come.

With the offsite storage of information required for data protection, for both long-term archiving and/or disaster recovery, mobility and portability are essential. Tape is a great way to move and store a lot of data inexpensively. An automated tape library (ATL) *I/O station* is required to facilitate the import and export of media while maintaining continuous operation. A large-capacity station is a good idea for the data center that is moving larger quantities of data off-site. Portability also implies additional requirements for data protection. The IT staff needs to be able to encrypt any data leaving the data center to ensure the increased security of data in transit, keeping the enterprise out of the headlines and its executives out of court. The data center staff also needs to prove that retained data has not been altered, requiring support for WORM[5] media to address compliance with industry and government required standards. A library that can support both mainframe tape drives and cartridges *and* open systems LTO tape is critical for those with a mixed architecture.

The management and administration of both are other important elements in the information infrastructure. In order to simplify the enterprise archiving environment, the data center requires a web-based management capability to enable the remote management and administration of library functionality. It also needs a heterogeneous automated tape library (ATL) with a common management supported from a single pane of glass. Inherent in this is the preference for a single vendor to provide one shoulder to lean on when multi-tier expansion is required or when something goes wrong.

One company with almost half a century of both tape library and disk experience is Oracle, first with their STK tape and disk heritage, and now with more than a decade of experience with the LTO technology.

Oracle StorageTek LTO-6 Drives

Oracle continues to focus its tape technology innovation on the tiered storage infrastructure found in libraries within heterogeneous environments, including both mainframe and open systems. Oracle has emphasized reliability, availability, and scalability (RAS), in its ATL products with an eye on investment protection, ease of use, and lowering the TCO of the IT infrastructure. Its libraries scale from the 30-slot *SL150* to over 100,000 slots in the *SL8500*. With an I/O station supporting a cartridge access port of up to 780 slots, Oracle provides the flexibility and portability required in enterprise environments. Now, with its new *StorageTek LTO-6* tape drive, Oracle continues that emphasis for the open systems arena.

Oracle has retained all of the features and functions of previous generations of its LTO drives, and now delivers more: more capacity and more energy efficiency. Oracle offers multiple models of the LTO-6 drive, both SAS

---

[2] *Linear Tape Open*, also called *Ultrium*.

[3] See **The Clipper Group Navigator** entitled *Magnetic Tape Turns 60 – The IT Industry Receives Another Gift* dated July 12, 2012, and available online at http://www.clipper.com/research/TCG2011015.pdf.

[4] See **The Clipper Group Navigator** entitled *LTO Program Announces Next Gen Tape – LTO-5 Raises the Bar for Tier-3 Storage* dated January 31, 2010, and available online at http://www.clipper.com/research/TCG2010002.pdf.

[5] WORM=Write Once, Read Many.

and Fibre Channel (FC), depending upon the library platform. These are available with a SAS interface for standalone tape drives and the SL150 tape library and a FC interface for library automation in support of Oracle's SL150[6], *SL500*, *SL3000*, and SL8500 Tape Libraries[7]. Each LTO-6 drive is capable of storing 2.5TB of raw capacity and up to 6.25TB compressed, using a 2.5:1 compression ratio. These models are designed for the heavy demands of backup and recovery and the archiving of data for long-term storage and use. Oracle's new drives can be deployed with Oracle's *StorageTek Tape Analytics Software*, optional for tape management, and also with Oracle's *StorageTek Linear Tape File System (LTFS), Open Edition*, included, free of charge and posted on the Internet.

Oracle StorageTek Tape Analytics

Oracle StorageTek Tape Analytics is specifically designed for StorageTek tape libraries, monitoring LTO drives manufactured by HP or IBM, and enterprise drives manufactured by Oracle. It also provides multi-vendor media support, including media from any LTO media vendor, such as Imation, Fujifilm, TDK, Sony, or Maxell, as well as enterprise tape media for Oracle tape drives.

It simplifies tape storage management. It monitors over 100 attributes covering operational performance, both drive and media utilization, and life/health information for both, empowering the IT staff to make proactive decisions prior to device/media failure. Oracle StorageTek Tape Analytics takes a proactive approach to eliminate library, drive, and media errors, using Oracle's proprietary algorithms. It also improves operational efficiency by gathering performance data without entering the live data path and scales to meet the growing needs of the data center. StorageTek Tape Analytics supports multiple geographically-dispersed libraries from a single interface.

Oracle LTO-6 Advantages

With LTO-6, Oracle has increased both the capacity and performance over the *LTO*-5 tape drive to better handle the growth of voluminous data within the data center, while controlling the costs of long-term data storage. The LTO-6 Ultrium drive combines high capacity, tape reliability, and performance at an open systems price. Oracle's LTO-6 drives provide the following commodity features to improve performance, security and reliability.

- **Increased native data transfer rate** to 160MB/second or 1.44TB/hour, with 2.5:1 compression.
- **Hardware encryption using AES 256-bit** to ensure easy-to-use security for protection of the most sensitive data while preventing unauthorized access to that data.
- **Decreased power consumption for the drive when no cartridge is present**, defaulting into hibernation mode after a short period of inactivity.
- **Support for a WORM cartridge** that will prevent the alteration or deletion of user data,
- **An 8Gbps FC dual-ported interface or a 6Gbps interface** enabling direct connection to SAS-equipped servers, depending upon the model.

In terms of cost, LTO-6 has made a significant impact on the TCO of the IT infrastructure. First, in terms of acquisition cost, with a list price starting at less than $7,000 for an SL150 library with one SAS LTO-6 Ultrium drive, it lowers the per terabyte cost for compressed data over an LTO-5 deployment, and even more so when compared to LTO-4 and LTO-3. LTO-6 media is available at about $.039 per GB, offering very cost-efficient, compact, and energy-efficient storage. With previous versions of LTO media pricing as a guide, LTO-6 media can be expected to decline in the future, potentially reducing data center costs by a factor of two.

Oracle's STK T10000C

In addition to offering a broad line of disk storage products, Oracle also provides its clients with a choice of tape architectures. In addition to Oracle's StorageTek LTO-6 drive, Oracle is one of the few companies that continues to provide an enterprise-class tape drive for its ATL customers – the third generation of its enterprise-class STK

[6] See **The Clipper Group Navigator** entitled *Oracle Says "Yes" to the SMB and Introduces a Scalable Tape Library* dated August 30, 2012, and available online at http://www.clipper.com/research/TCG2012020.pdf.

[7] See **The Clipper Group Navigator** entitled *Oracle Breathes New Life into Tape Libraries by Introducing LTO-5 into StorageTek Family* dated August 23, 2010, and available online at http://www.clipper.com/research/TCG2010039.pdf.

T10000 tape drive, the *StorageTek T10000C*[8], in addition to the open systems LTO drives. The T10000C has the highest uncompressed capacity of 5.5TB, more than twice that of LTO-6, with a throughput of up to 252MB/second, 57.5% faster than LTO-6. In fact, there are a plethora of reasons[9] why data centers using their tape library in an open systems environment should consider using the T10000C tape drive in support of open systems applications, not the least of which is that for large capacities and performance requirements, the TCO of the enterprise T10000 solution is often more attractive than a comparable LTO configuration.

The public roadmap for the next generation of Oracle's enterprise tape drives is projected to be an uncompressed cartridge capacity of 7-to-9 TBs, resulting in an SL8500 total uncompressed capacity of 700-900 PBs. As with the StorageTek LTO-6 drive, the StorageTek T10000C takes advantage of Oracle's LTFS software, at no additional charge. Oracle StorageTek Tape Analytics also is available to monitor and manage the T10000C.

Conclusion

With every enterprise collecting and analyzing more and more data every day, it has never been as important as it is now to be able to preserve and protect mission- and business critical data. In order to deploy a cost-efficient environment that lowers the TCO of the IT infrastructure, the IT staff must have the right tools for every storage tier. When considering the long-term storage of data, that tool is tape.

With the availability of both STK T10000C enterprise drives and, now, the new LTO-6 open systems tape solutions, Oracle can deliver the right solution for your Tier-3 environments. Oracle can provide every data center with the right tools, no matter what the environment. With scalable ATL products that protect the investment in existing technology, Oracle can lower the TCO of your long-term storage requirements. With Oracle StorageTek Tape Analytics deployed, Oracle can also increase the ease-of-use for the tape administrators. If your enterprise is concerned about the growth, and cost, of long-tem storage, you need to consider the advantages of an Oracle StorageTek tape solution.

[8] See **The Clipper Group Navigator** entitled *Oracle Fulfills Commitment – StorageTek T10000C Takes Leap Ahead* dated January 31, 2011, and available online at http://www.clipper.com/research/TCG2011003.pdf.

[9] See *The Clipper Group Captain's Log* entitled *Ten Reasons Why You Should Consider Enterprise-Class Tape for Open Systems Storage* dated July 12, 2011, and available online at http://www.clipper.com/research/TCG2011025.pdf.

About The Clipper Group, Inc.

The Clipper Group, Inc., now in its twenty-first year, is an independent publishing and consulting firm specializing in acquisition decisions and strategic advice regarding complex, enterprise-class information technologies. Our team of industry professionals averages more than 25 years of real-world experience. A team of staff consultants augments our capabilities, with significant experience across a broad spectrum of applications and environments.

- ***The Clipper Group can be reached at 781-235-0085 and found on the web at www.clipper.com.***

About the Author

David Reine **is a Senior Contributing Analyst for The Clipper Group.** Mr. Reine specializes in enterprise servers, storage, and software, strategic business solutions, and trends in open systems architectures. In 2002, he joined The Clipper Group after three decades in server and storage product marketing and program management for Groupe Bull, Zenith Data Systems, and Honeywell Information Systems. Mr. Reine earned a Bachelor of Arts degree from Tufts University, and an MBA from Northeastern University.

- ***Reach David Reine via e-mail at dave.reine@clipper.com or at 781-235-0085 Ext. 123. (Please dial "123" when you hear the automated attendant.)***

Regarding Trademarks and Service Marks

The Clipper Group Navigator, **The Clipper Group Explorer**, **The Clipper Group Observer**, **The Clipper Group** *Captain's Log*, **The Clipper Group Voyager**, **Clipper Notes**, and *"clipper.com"* are trademarks of The Clipper Group, Inc., and the clipper ship drawings, *"Navigating Information Technology Horizons"*, and *"teraproductivity"* are service marks of The Clipper Group, Inc. The Clipper Group, Inc., reserves all rights regarding its trademarks and service marks. All other trademarks, etc., belong to their respective owners.

Disclosures

Officers and/or employees of The Clipper Group may own as individuals, directly or indirectly, shares in one or more companies discussed in this bulletin. Company policy prohibits any officer or employee from holding more than one percent of the outstanding shares of any company covered by The Clipper Group. The Clipper Group, Inc., has no such equity holdings.

After publication of a bulletin on *clipper.com*, The Clipper Group offers all vendors and users the opportunity to license its publications for a fee, since linking to Clipper's web pages, posting of Clipper documents on other's websites, and printing of hard-copy reprints is not allowed without payment of related fee(s). Less than half of our publications are licensed in this way. In addition, analysts regularly receive briefings from many vendors. Occasionally, Clipper analysts' travel and/or lodging expenses and/or conference fees have been subsidized by a vendor, in order to participate in briefings. The Clipper Group does not charge any professional fees to participate in these information-gathering events. In addition, some vendors sometime provide binders, USB drives containing presentations, and other conference-related paraphernalia to Clipper's analysts.

Regarding the Information in this Issue

The Clipper Group believes the information included in this report to be accurate. Data has been received from a variety of sources, which we believe to be reliable, including manufacturers, distributors, or users of the products discussed herein. The Clipper Group, Inc., cannot be held responsible for any consequential damages resulting from the application of information or opinions contained in this report.