

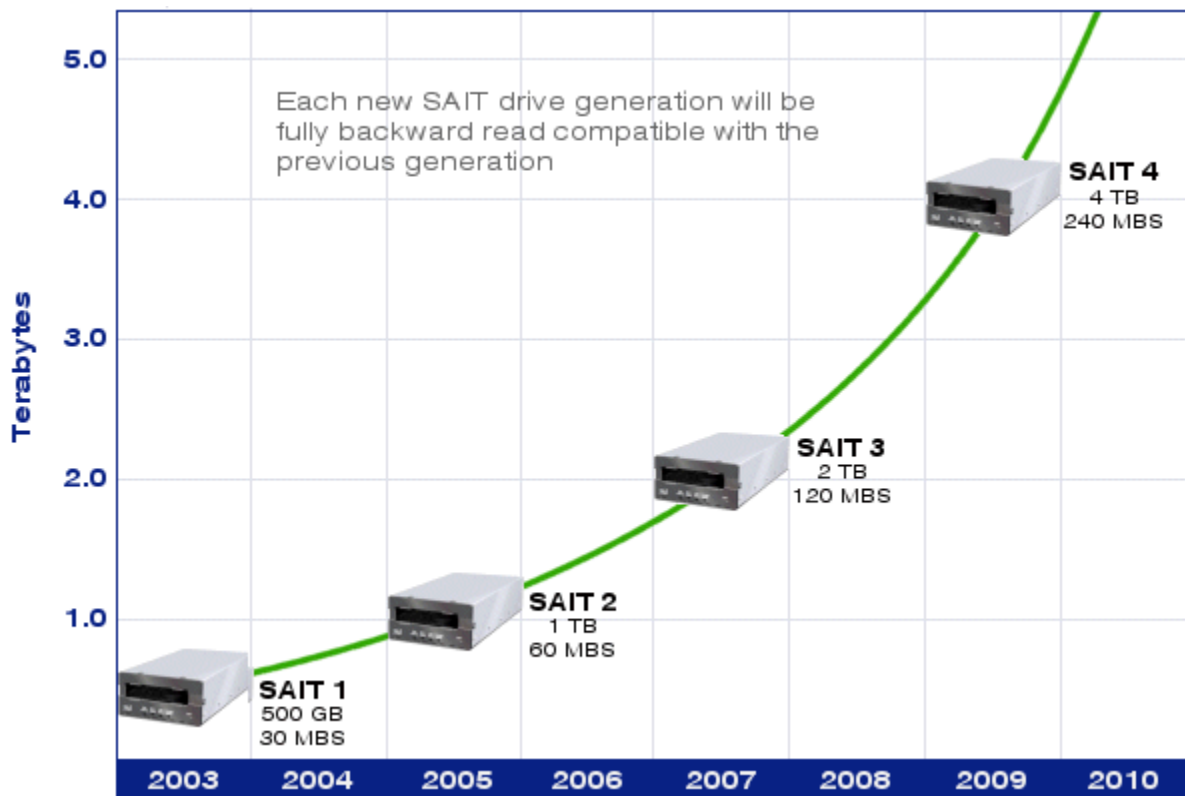
New Advances in Digital Video Archives for the Media and Entertainment Industry

The media and entertainment industry is rapidly transitioning from analogue to digital in the production process, and subsequent storage and management of digital media. Digital video creates management challenges due to the nature of the content. These digital assets are typically of high value, are represented as large files which must be handled at high data transfer rates and must be retained for long time periods. Advances in the computer industry over the last few years have risen to these challenges, creating cost-effective solutions for management of digital video assets.

This paper focuses on using the latest tape technologies, library automation, Windows servers and new archive management software to provide high performance solutions optimized for the archive and retrieval of digital video assets. XenData Software represents a new breed of archive management that is tightly integrated into the server operating system and does not need special integration with the video applications such as those running on a video server, an automation system or a media asset manager (MAM).

New High Capacity Tape Formats

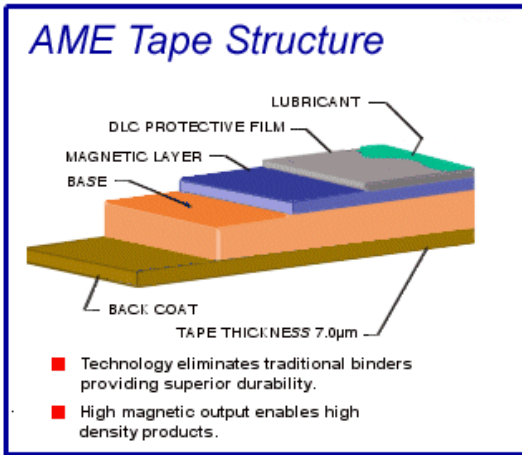
The highest capacity tape cartridge format available today is SAIT-1, developed by Sony. It delivers excellent performance, providing a native capacity of 500 GB per cartridge and operating with a data transfer rate of 30 MB/s. The roadmap for future generations of SAIT shows Sony's intention to maintain a leading edge in tape technology.



The SAIT roadmap delivers industry-leading storage density per tape, outpacing other tape technologies.

Conventional magnetic tape production techniques use a magnetic layer that is applied to the base film with glue-like binder. This coating technique results in a tape composition containing less than 50% magnetic material.

The Sony Metal Evaporated (ME) technique developed in 1989 was the forerunner of today's AME (Advanced Metal Evaporated) process that is used with SAIT media. The AME process uses a high-energy electron beam and high vacuum to evaporate and deposit pure magnetic cobalt on the base film. The AME media contains more magnetic material in a more uniform distribution providing superior magnetic performance and resulting in higher recording density.



The SAIT AME media not only provides a high data density but high durability, with a projected archival lifetime of 30 years. This durability is in part due to the media protective layer, termed DLC (Diamond Like Carbon). During the DLC coating process, the metal magnetic layer is protected with a very thin crystallized carbon layer. The DLC layer is about 20 times harder

than metal oxides (the material normally used to make grinding wheels). DLC makes the surface of the tape extremely smooth for reduced wear and longer head life.

Another aspect of SAIT that contributes to its excellent performance is R-MIC (Remote-Sensing Memory in Cassette), which is a 64 KB memory chip built into every SAIT cartridge. High-speed file search is facilitated by data maintained by the drive and stored on the R-MIC chip. In addition R-MIC also contains cartridge usage and performance data that can be accessed by storage management applications and library systems.

Library Automation

SAIT drives have been integrated into automated tape libraries from a number of vendors. The first company to embrace SAIT was Qualstar Corporation which offers SAIT tape libraries with capacities from 22 TB to 132 TB.



Qualstar tape libraries include rack-mount and floor standing units. The product range has a reputation for very high reliability.



Sony's own high-end tape automation products, the PetaSite libraries, are now available with SAIT drives. PetaSite offers huge scalability up to 3,000 SAIT tape cartridges, providing a capacity of 1.5 PB (1,500 TB).

Sony PetaSite libraries are modular and highly scalable.



Server Advances

Computers based on Intel processors have continuously advanced to a level of performance where, today, even a basic PC has more than enough computing power to manage video files. The latest Microsoft server operating system, Windows Server 2003, supports both 32-bit and 64-bit processors and scales from single processor solutions all the way up to 64-way systems. Windows servers have more than enough power to handle the largest digital video archive.

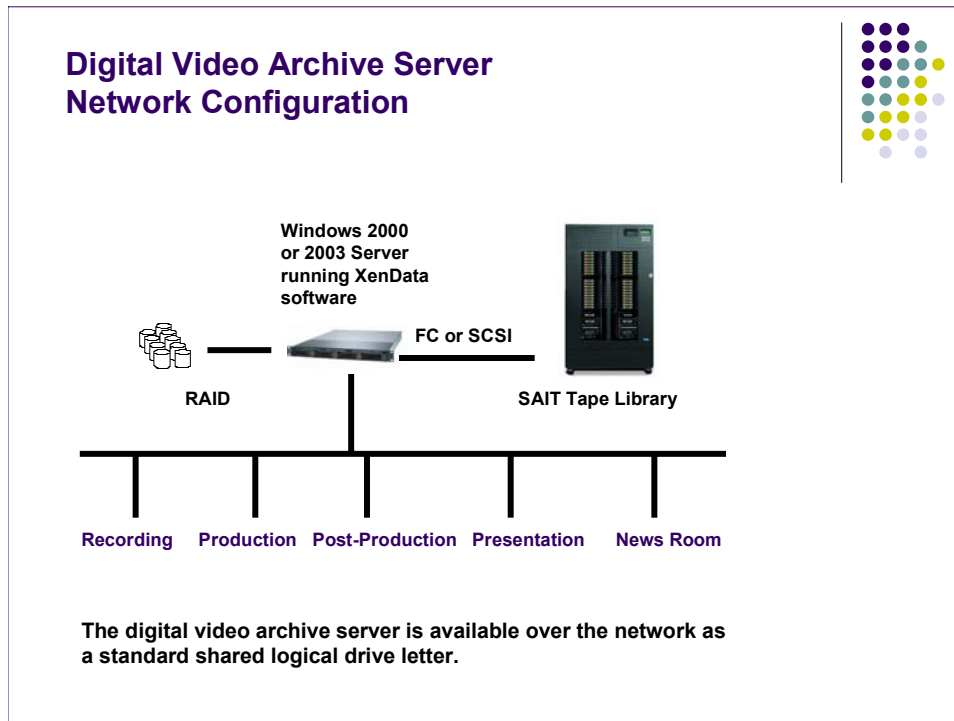
The Windows Server operating systems have also made enormous strides forward in terms of reliability and availability. Both Windows 2000 Server and Server 2003 provide highly dependable platforms.



Now that Windows Server systems based on Intel processors meet the performance and dependability requirements for a large scale digital video archive, they offer a very attractive solution because of cost. Compared with UNIX servers, they offer a much lower total cost of ownership. Early adopters of Windows Server 2003 found they could operate their server infrastructure with up to 30 percent greater efficiency. The productivity benefits also extend to application development which results in more functionality at lower cost for applications that are developed in the Windows environment.

XenData Software for Digital Video Archive Management

Many earlier software products for archiving digital video to a tape library required a special interface within the application, whether that application was running on a video server, an automation system or a media asset manager (MAM). This is no longer necessary as a state-of-the-art software product can ‘virtualize’ RAID and a tape library, presenting these physical storage devices as a single logical drive letter that may be shared over the network. This is the approach taken by XenData and it means that if an application can archive and retrieve video files to and from a magnetic disk volume, the application will work with a digital video archive server running XenData software.

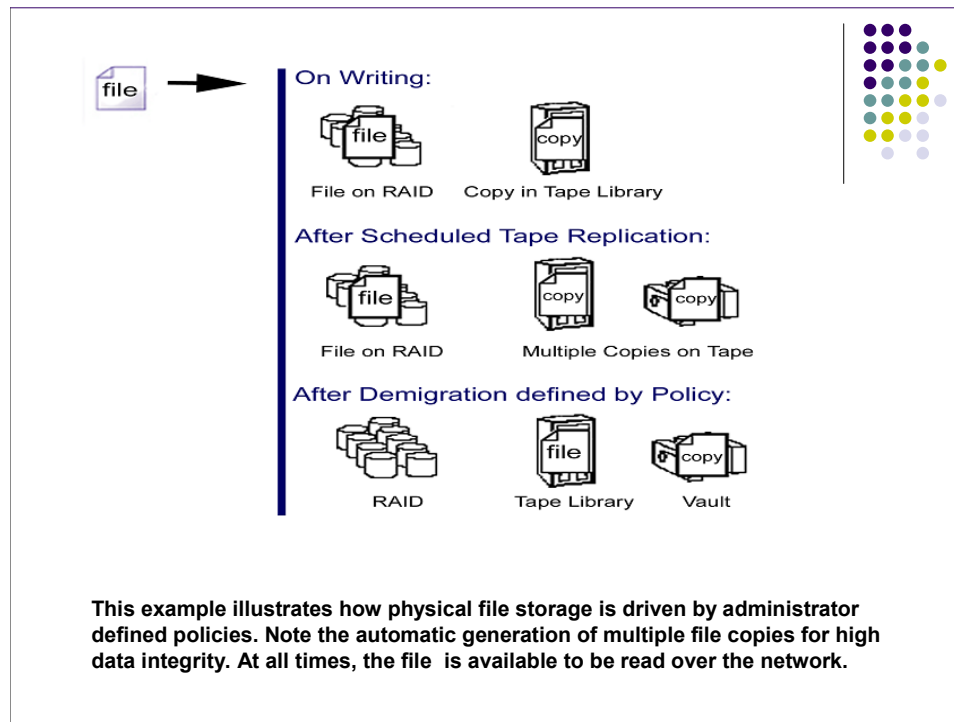


XenData software stores the video files on RAID and tape according to policies set by the administrator. This approach provides policy driven:

- hierarchical storage management (HSM) based on de-migration to obtain even higher performance that is available from the tape library alone; and
- automated tape cartridge replication for the generation of an unlimited number of tape cartridge copies for off-site (including multi-site) retention.

XenData Software – Combining HSM & Data Replication

Typically, video files must be transferred at high data rates and represent an asset of high value. XenData Software addresses both of these aspects of video data via its architecture that combines hierarchical storage management based on de-migration (rather than traditional migration) and automatic tape cartridge replication.



A typical file management policy is illustrated in the diagram above. On writing, a file would be written simultaneously to both RAID and a specified group of tape cartridges. This immediately provides two copies of the data for high data integrity. The system administrator will have predefined a replication schedule and the number of tape copies for replication. After all copies of the file have been produced, the file may be de-migrated from RAID according to the administrator-defined policy. On reading the file, it is always retrieved from the fastest physical storage device. If it is stored on magnetic disk and tape, the file will be read from disk. If the file is available only on tape, it will be retrieved from tape.

A single server may have many different policies, tailored to the needs of the different file types that are being archived. For example, low resolution files may be permanently retained on RAID, but high resolution video files will be archived on tape alone, which is achieved by de-migrating from RAID as soon as the last replica is written, freeing up space on magnetic disk.

This approach to video file management delivers both high data integrity and high performance, taking full advantage of the attributes of both magnetic disks and tape.

XenData Software Additional Features

Additional features of a digital video archive server based on XenData software include:

- Multiple Tape Sets - the Administrator can group related files together on the same set of tapes.
- Dynamic Expansion of Tape Sets - the system will dynamically expand tape sets to meet capacity demands.
- Cartridge Spanning - the system supports storage of large files across multiple tape cartridges.
- Off-Line Tape Cartridge Management - the system retains meta-data for off-line cartridges.
- Security - XenData software is fully integrated with the Microsoft Windows security model, based on Active Directory.
- Standard Tape Format - open standard GNU TAR file format is used on the tape, allowing the tape cartridges to be read using standard third party utilities.
- Rapid file system recovery, in case of disaster
- Familiar administration of policies via Microsoft Management Console.

Conclusions

As the demand for highly scalable digital video archives increases, new products have come to market that meet the special needs of the media and entertainment industry:

- SAIT tape has the highest capacity per tape cartridge available today. In addition, it offers a fast data transfer rate and a 30 years data lifetime, making it ideal for video archiving applications.
- Intel / Windows servers are now more than capable of delivering the performance and dependability required for digital video. They offer the most attractive platform for digital video archives because of low total cost of ownership.
- XenData software provides a new approach to archive server management that works with existing video applications without need for special interfaces. It delivers a new level of performance and data integrity for archiving valuable digital video assets.

Useful Links

www.saittape.com

SAIT tape format

www.qualstar.com

Qualstar tape automation

www.xendata.com

XenData software.

For more information, please contact:

*XenData, Inc.
1255 Treat Blvd, Suite 300
Walnut Creek, CA 94597, USA
Phone: 925.472.6522*

*XenData Limited
Sheraton House, Castle Park
Cambridge CB3 0AX, UK
Phone (UK): +44 1223 370114
Phone (Germany): +49 89 99216 422*

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