Success Story

Sony DADC Manufacturing

Challenge

Overcome network bottlenecks; reduce high system administration costs; control soaring storage costs; prepare for rapid growth in demand

Solution

Eliminate productivity bottlenecks and consolidate data resources by installing an SGI high-speed SAN with InfiniteStorage Shared Filesystem CXFS; implement SGI DMF for tiered storage and automated data management

Results

Increased throughput; reduced data storage costs; reduced system administration costs; shorter data retrieval times

SGI at Sony DADC: Automated Data Management for a Million-Disc-a-Day Plant

Here's an ordinary, run-of-the-mill production day at Sony DADC in Terre Haute, Indiana: 600,000 music CDs; 500,000 UMDs (Universal Media Discs for Sony PlayStation Portable); and 1,300,000 DVDs. Not bad for a facility that turned out 300,000 CDs a month when it opened in 1983.

In this 700,000-square-foot plant, 1200 people turn out a wide spectrum of digital entertainment on 119 replication lines and 26 automated packaging lines. To replicate discs, they need stampers, which are made from master discs. Multi-gig media filesets move automatically from receipt to storage to queue to mastering machines. Sony DADC uses SGI InfiniteStorage technology to automate data management in this high-production environment.

Powering the Digital Entertainment Wave

The Sony DADC Global Network, with 13 facilities worldwide, is a leading force in digital entertainment. The company is really a digital delivery organization, and its strengths are quality, speed, and innovation. Sony DADC (for Digital Audio Disc Corp.) does much more than produce CDs, DVDs, and UMDs. It develops technologies to protect content. It turns discs into marketing tools by adding secure links that take viewers to bonuses or prizes. And it provides all the services needed to take products to market, including authoring, postproduction, graphic design, and packaging. The company is now gearing up to produce the next big thing: 25GB Blu-ray discs that can hold a complete movie in high-def format.

The Sony DADC facility in Indiana is just as innovative in its approach to mastering. All media – music, games, videos and movies – moves in industry-standard DDP format through a totally automated process under Sony DADC's Network Mastering Control System. The DDP (Disc Description Protocol) fileset contains all the information required to produce the final packaged disc.

About 30 percent of all media comes into the plant as electronic file transfers (EFTs) that are already in DDP format and move immediately into the automated process. Even small studios and producers can send in DDPs this way to take advantage of Sony's production expertise. Files received as physical media (digital tapes and CD-ROMs) enter the process through an upload station and are converted to DDP. Filesets are stored on Fibre Channel RAID.

The system pulls the files from disk and queues them up for presentation to the cutters (mastering LBR-Laser Beam Recorder machines), which automatically start the laser cutting process. The masters emerge ready for plating.

Automation usually means speed, and that is definitely the case here. "This is meant to be a fast, lights-out scenario," says Sony DADC Systems Engineer Ray Kapperman. "We've had California customers with special projects that sent us DDPs over our open pipe. They were on a cutter less than 40 minutes after the customers finished their production releases."

Handling the Growth Challenge: An SGI Storage Solution

Data grows, and nowhere is this truer than in the digital media business. In 2004 the Sony DADC mastering group reached a decision point on data storage, driven primarily by DVD production upramps, increasingly larger files, a growing number of bottlenecks, and the looming arrival of Blu-ray, projected for 2006.

"Back in '96 or '97, we only had a 100GB drive and that would take us about two weeks to fill up," says Kapperman. "In 2000 we moved into a bigger library on a distributed architecture to hold down equipment costs. We found over time we needed more and more space and it became kind of a nightmare to add more equipment. Our storage costs kept going up.

"We had come to the point where we were getting ready to add another module to our tape library, which had entered its end-of-life phase. It came down to this: we could spend money on a system that was going to be discontinued, or find ways to streamline our whole data storage system."

Kapperman sat down with SGI representatives to work out the best solution for the expansion years ahead. In December 2004, SGI presented a proposal that included a new SAN running SGI InfiniteStorage Shared Filesystem CXFS and Data Migration Facility (DMF) on four SGI Origin 350 servers. A new tape library would provide a simple expansion path. Tiered disk storage would reflect workflow patterns. SGI started installing the solution in April 2005.

DMF: Automating Tiered Storage

"DMF was a key reason for going with the SGI solution," says Kapperman. "We had built our storage system modularly and built in some features that we needed. DMF allowed us to consolidate our storage and handle expansion."

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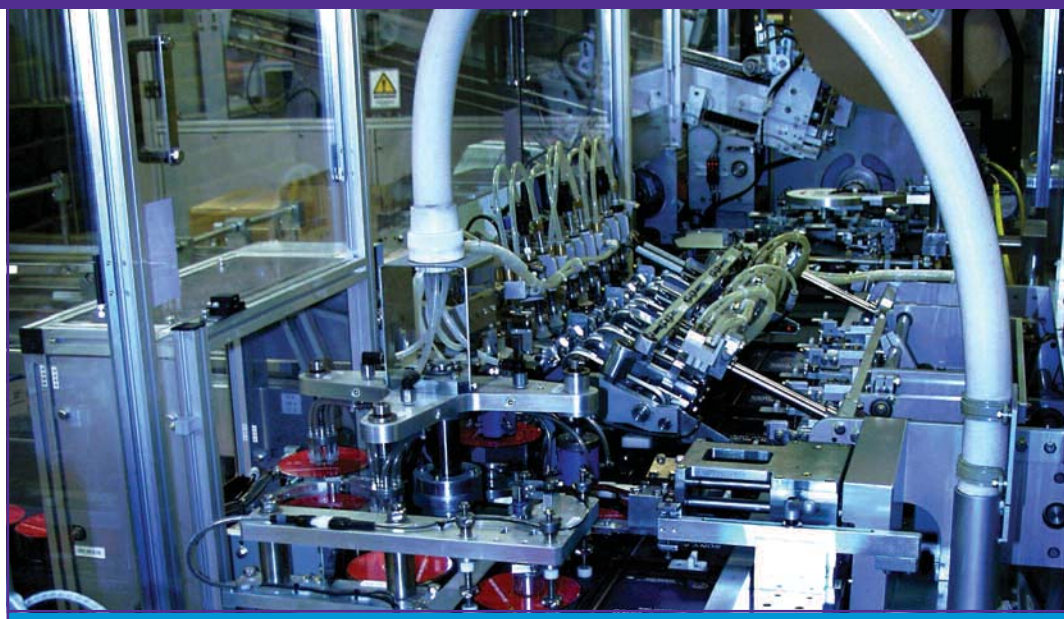
At last count Sony DADC's active base of images (DDP filesets) contained 62,000 CDs and 34,000 DVDs. Ingested DDPs, which can easily run to 5GB, are recorded on a 2.1-terabyte high-performance TP9300 Fibre Channel RAID from SGI. After seven days, DMF automatically moves filesets to the tape cache, a 7.3-terabyte SATA subsystem, where they live for a month. Ultimately the filesets are migrated from tape cache to a 500TB SGI STK SL8500 tape library.

"We can now keep new media live on a high-speed drive for about a week, which is more than enough time for most of our jobs to be cut," says Kapperman. "It then moves to our SATA tape cache for up to a month, so if we need to cut more metal from it, we can do it without having to pull from the tapes. In 2000, when we started with our first tape library, we often had to pull files from tape to cut more metal. Nowadays, with tiered storage and DMF, we hardly ever see tape hits, and things move more quickly.

"CXFS has also accelerated our workflow. Its big advantage for us is that files can be shared, so we don't have to move a lot of files around anymore. All data is instantly available to all systems without copies. That, and the speed of the box, enabled us to cut a lot of time off processing."

Another pressure point in disc production is that the cutters typically require a steady 4-5Mb/second data stream to feed the live laser. If the stream falls below the required speed, the job fails and must be restarted from the beginning. The speed and reliability of the SGI storage infrastructure are critical, and Blu-ray will be even more demanding.



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"The way we've set it up right now," says Kapperman, "with CXFS running on the main node of the metadata server, we run data to our cutters through a SAMBA connection. For the Blu-ray stuff that's coming we're looking at higher rates of speed, so we'll probably wind up putting those clients on a CXFS node directly."

Looking Ahead: Seamless Scaling of Servers and Storage

Growth is a way of life at the Terre Haute Sony DADC plant. On December 2, 2005, the company announced plans for the construction of an additional 90,000 square feet of floor space and the eventual addition of 50 more employees. This space, which is targeted at Blu-ray production, follows on the heels of a 46,000-square-foot expansion, completed in 2005, that gave Sony DADC new shipping, receiving, and storage space and resulted in the hiring of 100 people.

The scalability of the storage infrastructure and the flexibility of the SGI NUMAlink architecture gives Sony DADC freedom to adjust to any production demand. "A couple of weeks ago," says Kapperman, "I combined two SGI servers into one and easily doubled our I/O, our memory, and our CPUs. It took just a couple of hours. We're going to handle Blu-ray in the same way."

Sony DADC is preparing for Blu-ray production with major upgrades to its SGI storage system. The company has ordered a TP9700 controller; an additional 8TB of Fibre Channel disk capacity; an additional 16TB of SATA capacity; additional CXFS Windows client licenses; two 4GB 32-port Brocade switches; and more processors for the SGI servers.

Growth of tape capacity is equally inevitable. When the SGI solution was installed, the mastering group was storing 100TB across its disk and tape systems. By the end of 2005, it was storing 175TB. It won't be long before all 500TB tape capacity will be used. The SGI infrastructure takes all the pain out of this expansion.

"It will be easy," says Kapperman.

Cost/Benefits: A Quick Look

Here is Ray Kapperman's pre-installation comparison of the SGI solution with the existing system:

Storage Capacity:	Old system: 1.8TB Estimated demand, 2006: 2.4TB SGI SAN solution: 3TB, scalable to 100TB
Throughput:	Old system: 72MB/sec Estimated demand, 2006: 238MB/sec SGI SAN solution: 400MB/sec, scalable to 800MB/sec
Routing Time Compliance:	A reduction of 25% in processing times over the existing solution
Cost-effectiveness:	Consolidation with the SGI solution costs less than half the three separate projects previously considered

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