Success Story

SGI InfiniteStorage Solutions

Pacific Title Runs Real-Time 4K Digital Intermediates with SGI InfiniteStorage Solutions

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Pacific Title & Art Studio

Pacific Title & Art Studio, one of the most venerable and respected film optical houses in Hollywood since 1919, began transitioning to a digital workflow, which included SGI® technology, during the late Eighties. More than four years ago, Andy Tran, Senior Executive Vice President and Chief Technical Officer, Pacific Title and Art Studio, selected SGI technology as he began designing and implementing a storage area network (SAN) architecture that could scale in terms of bandwidth and performance. Tran expected the storage network to last no more than three years, given the rate technology changes. Instead, as he continued down the path to bring the company into the new digital world, Tran added more SGI® servers and storage capacity to scale the bandwidth. As 2K digital intermediate (DI) became a popular secondary color-correction process, he added even more SGI servers and storage and scaled up the bandwidth. Today, Pacific Title is a leader in 2K and 4K digital cinema mastering, and has once again added SGI® InfiniteStorage technology to scale up to the efficiencies of real-time 4K, with 4Gbit infrastructure.

Pacific Title serves the motion picture and television commercial markets with a full range of state-of-the-art digital and optical services. Over the last several years, Pacific Title experienced explosive growth in a number of areas, including scanning 35mm film negatives into digital format for color correction (digital intermediate, or DI), creating visual effects, performing film restoration, and archiving. The company also produces the majority of all U.S. movie trailers for theatrical distribution. Pacific Title currently has four 35mm scanners capable of digitizing film in HD, 2K, 4K, with two scanners that are capable of the experimental 6K, plus six laser film recorders capable of 2K to 4K output.

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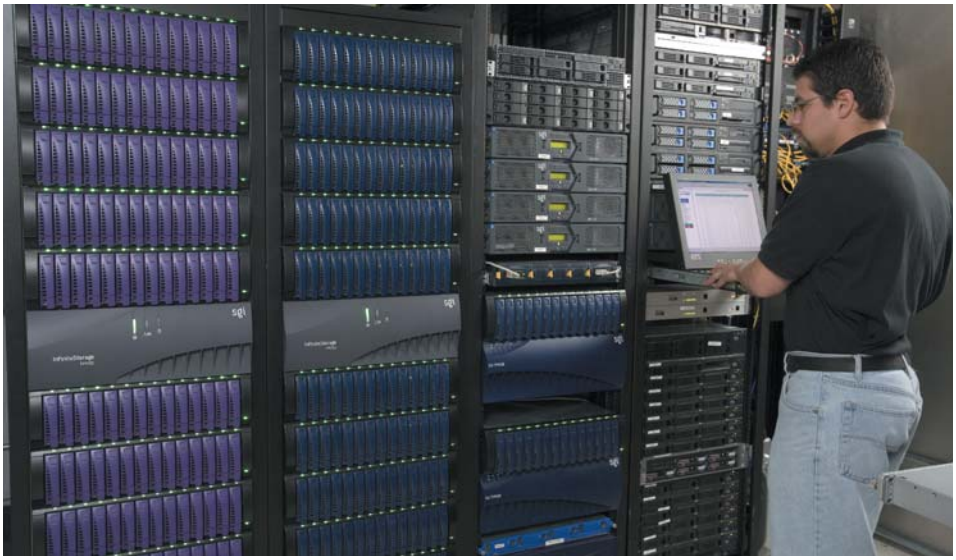
Today, the company has two DI suites currently working on four full-length feature films in 2K at the same time; Pacific Title generates 8 to 16TB of data per day in 2K and 4K DIs. All visual effects and trailer work is done digitally in high resolutions as well, at 10- or 12-bit depth, making the movement and storage of data—without bottlenecks—imperative.

While many movies today use the 2K resolution, Tran sees 4K poised to become the industry standard within six to nine months. To that effect Pacific Title has added a third DI suite, which will allow the company to run more DIs concurrently, in real time. To run more DIs concurrently in 4K and in real time, however, much greater bandwidth performance is required. Pacific Title added two SGI® InfiniteStorage 6700 systems with 50TB storage and one SGI® InfiniteStorage TP9700 with 60TB SATA storage to its existing 300-plus TB SGI® InfiniteStorage SAN solution with SGI® InfiniteStorage Shared Filesystem CXFS™.

"We are doing four concurrent 2K DIs right now in our two DI suites," says Tran. "That drives more bandwidth demand, more performance. Every time we do a DI, if we want to play back a move or color correction, or the client wants to review something, it requires 300 megabytes per second, just for that particular room. So, with two rooms, that's 600 megabytes per second, but there's also ancillary support outside the room: there's rendering, conforming, and a lot of other support adding to the data stream before they actually see the film in the room. That means we may have 1.6 gigabytes to 2 gigabytes of data being read from the SGI SAN.

"There are other applications that do 2 gigabytes per second," notes Tran, "but they slow down and speed up again. We work with film the same way you see it when you're sitting in a movie theater: 24 frames per second is passing from the screen through your eyes. Now, imagine you're sitting in a theater and every two minutes, the movie slows down, speeds up, slows down, and so on. Does that work for you? I don't think so. The technology I built over the last couple years with SGI's help and SGI CXFS allowed us to scale up to where we are now at up to 2 gigabytes per second. But, with our new suite, and the growing demand for 4K—which generates data rates in excess of 850 megabytes per second—we needed a storage network system to support more



4K concurrent paths with greater bandwidth—and in real time, so we can do more and more films in 4K."

The new DI suite at Pacific Title is a custom theater designed for producers and executives. The suite contains a 2K digital projector, a large screen, and the application driving the suite is Autodesk's Lustre, capable of 2K to 4K color grading. Behind the scenes, moving the data, the SGI InfiniteStorage 6700 system is explicitly designed to deliver industry-leading throughput of streaming data in real time—at nearly 3 gigabytes per second (GBps) sustained, for read or write. The SGI InfiniteStorage 6700 system's real-time isochronous architecture features 4Gbit Fibre Channel connectivity, which can link entire enterprises in multiple locations at the highest speed available today. With two locations in Hollywood, one for digital scanning and recording, and the original 1919 site which handles the digital effects and optical work, the entire company is linked via 10 Gbit network through SGI servers, with plans to add an additional 10 Gbit to enable 20 Gbit networking between the two locations to move data more rapidly.

Specifically addressing the problems of faster turnaround in a 4K data-centric media environment, SGI InfiniteStorage 6700 provides real-time file delivery in 4K by linking the storage with 4Gbit Fibre Channel at 3 GBps bandwidth.

"Now we can actually scale almost infinitely," says Tran. "With the new Fibre Channel Brocade 4800, with our 4Gbit infrastructure with 256 ports of 4Gbit, plus the additional 50 terabytes of raw SGI InfiniteStorage 6700, we achieve our goal to do not only 2K concurrently, but 4K concurrently in real time."

Pacific Title's Arsenal of SGI InfiniteStorage Technology

A long-time SGI customer, Pacific Title uses two SGI® Altix® 350 servers, more than 11 SGI® Origin® 350 servers, four Onyx® 350 visualization systems running Discreet® Inferno® and other Discreet® software, and an SGI® Onyx® 3200 visualization system which also runs Discreet products.

Early last year, seeking to expand digital intermediate capacity in their two DI suites, and to provide the throughput needed for high-speed film (data) transfers, Pacific Title purchased two SGI® InfiniteStorage TP9500 storage arrays and an SGI® Origin® 300 server, with a total of approximately 30TB of disk. An early adopter of SGI InfiniteStorage systems, Pacific Title also purchased three SGI InfiniteStorage TP9700 systems later in the year, expressly to rev up to 4Gbit speeds. The SGI InfiniteStorage SAN, which now consists of all these storage arrays, including the just-added fourth SGI TP9700, uses CXFS to link the various SGI visual workstations, numerous Macintosh® workstations, 30 Macintosh render nodes, 50 Linux® render nodes, the SGI Onyx 3200 and five 8-processor SGI Origin 2000 servers. The SGI InfiniteStorage solution and SGI CXFS shared filesystem within the SAN environment enable high-speed sharing of media assets between IRIX® OS-, Mac OS® X-, Windows® OS-, and Linux OS-based systems without copying files. Pacific Title also purchased the SGI CXFS

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environment to support digital scanning and recording on two very high-speed—2K to 6K resolution—Northlight film scanners, manufactured by FilmLight in the UK. To accommodate researchers, Pacific Title is exploring up to 6K resolution for long-term digital master archiving.

"The files generated by the Northlight scanner range from 12MB per 35mm frame at 2K up to 150MB per frame at 6K resolution, but there's nothing out there that can support that environment, except SGI. We've put the film scanner interface onto a Silicon Graphics Octane2 workstation with CXFS to sustain the data rate, which no one else could do," explains Tran. "Without CXFS, our scanners were performing at maybe one-third of the speed they're capable of. With CXFS, it can now run them at full speed, without interruption. For instance, without CXFS, scanning one frame at 2K required about 13 seconds, but now, with CXFS, we can scan 2.1 frames per second at 2K. At 4K resolution, it used to take 30 seconds to scan one frame. Now we can do 4K at 4.2 seconds per frame. The CXFS API can push the data fast enough so that we no longer have any bottlenecks that bog down the data flow. Additionally, with CXFS, our Linux cluster can run at full computational speed as well, rendering it out. We chose CXFS because it is simply the only file system that can handle the speed and the throughput we need."

Pacific Title has recently utilized SGI InfiniteStorage SAN with CXFS on a number of major motion pictures such as Fox Searchlight Pictures' *The Hills Have Eyes* as well as spring 2006 release Universal Pictures' *American Dreamz*, and Warner Bros.' *Poseidon* and Universal Pictures' *Whisper* due out later this year. The latest films to undergo full DI treatment include Millennium Films' *Lonely Hearts*, Katapult Films' *Little Trip to Heaven* and 20th Century Fox's *John Tucker Must Die*.

Because of SGI CXFS, Silicon Graphics is the only company to offer a SAN wherein a digital lab or visual effects studio does not have to waste time copying files for different operating systems. With the new SGI InfiniteStorage 6700 systems and 4Gbit Fibre Channel architecture, working in the large files sizes of 4K will be real time, on time, every time. A groundswell of SGI SAN sales is now occurring in high-volume Hollywood labs and studios, as the migration to a file-based and networked architecture workflow becomes the norm.

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