Success Story

SGI at Laboratoire Éclair: Going for Speed with CXFS™

Digital techniques have become an integral part of film production. In 2001, Laboratoire Éclair digitally postproduced 11 feature-length films, and one of them (Jean-Christophe Grangé Pitof's *Vidocq*) was the first feature-length film in Europe to be shot entirely using the new Sony HD digital camera. To date, only a handful of films worldwide have been shot and postproduced using entirely digital techniques.

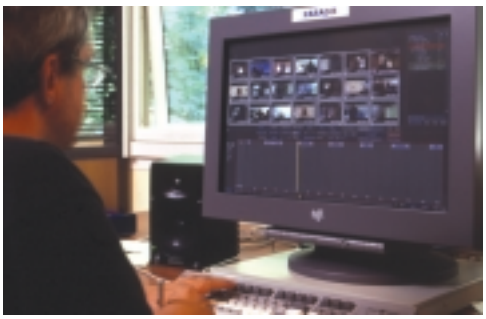
Laboratorie Éclair is taking the next steps in the move from analog postproduction to a fully digital production and postproduction workflow.

A Legendary Film Processor Becomes a Digital Leader
Laboratoire Éclair was established in 1907. Its renowned laboratories and studios in Épinay, France, continue to develop films and shoot and produce 35 mm prints for release to movie theaters. In recent years, the company has expanded into digital services. Éclair now does frame-by-frame scanning and digitization of 35 mm negatives, using SGI® technology to perform restoration techniques or add special effects and to transfer the digital frames back to film. SGI graphics workstations and servers run the Kodak™ Cineon™ system, Discreet™ flame®, flint®, inferno®, and smoke® systems, and Nothing Real™ Shake™ software. To handle the data load, Éclair needed an architecture capable of moving huge volumes of data among the scanners, the workstations, and the film recorders.

"We're moving toward a completely digital system because we know that sooner or later all postproduction will be entirely digital," says Philippe Soeiro, who manages the digital side of Éclair. "We therefore had to design and build an architecture that covers the entire process."

The Challenge: Moving Mountains of Data
Many of the films that move through Éclair's facility require multiple digital processes that can include 3D effects, compositing, calibration, repair of damaged frames, and the removal of extraneous frame elements such as cables, poles, and scaffolding. The number of films that require this kind of treatment is increasing.

To provide all these services, Éclair must move enormous quantities of data. Scanning a single frame at two kilopixels per line yields an uncompressed 8–12MB file. At that rate, a 105-minute film requires about 2TB of storage space, and the information has to be accessible at high transmission rates. Éclair initially used the NFS protocol for data storage and movement, but NFS limited available bandwidth to 14MB per second and frequently resulted in bottlenecks and delays. Éclair, with an eye to its time-sensitive customers, looked for a better way to move data. The solution: a SAN featuring an SGI® Origin® 200 file server running SGI® CXFS (clustered extended filesystem).



Digital Systems at Éclair

Scanning
A Thomson multimedia Spirit Datacine scans at 2K pixels per frame with an efficiency of five frames scanned per second, while the old equipment took 15 seconds per frame.

Calibration
Thomson multimedia Specter incorporates an SGI® Origin® 2000 server. Images are displayed and calibrated in real time using a Pandora Pogle Megadef color corrector. The system supports a 350MB per second transfer rate.

Film Recording
A Thomson multimedia Phantom Transfer Engine module interprets the HIPPI data streams from the Spirit Datacine and Specter VDC, enabling exchanges with a standard filesystem.

Restoration/Special Effects
Twelve Silicon Graphics® Octane®, Silicon Graphics® Octane2™, Silicon Graphics® Onyx2® graphics stations and SGI Origin 2000 servers, connected to the SAN, run Kodak Cineon, Discreet flame, flint, inferno, smoke, and Nothing Real Shake.

SAN Plus CXFS: A Quantum Leap in Bandwidth

The high-speed SAN architecture with its Fibre Channel technology solved many of Éclair's technical problems, including the need to deliver consistent information to 12 client hosts. Above all, bottlenecks vanished and delays became a thing of the past. Éclair consolidated its disk storage onto a single 800GB RAID rack providing 100MB per second bandwidth.

At the same time, Éclair implemented SGI CXFS on its SGI Origin 200 server, which means that all files stored on the RAID can be shared at fast transfer rates over the SAN by Éclair's 12 hosts. Due to the bandwidth and real-time requirements of most of the Discreet applications, this file-sharing capability is used as a way to boost the movement of large digital assets from the central repository to the client hosts and back to the server. This centralized high-speed filesystem produced an immediate savings by enabling a faster workflow of data between hosts. "Our aim was to minimize response times and transfer times so that things don't become unmanageable, given the number of workstations," says Soeiro.

CXFS unifies the available disk space on the SAN. "The combination of the SAN and CXFS gives Éclair the performance of a local disk with the advantages of network storage," says Soeiro. "The return on investment is so fast that CXFS justifies the changeover to the SAN all by itself."

For file sharing, a SAN is superior to network-attached storage because it optimizes the size of the data-transfer packets in a range from a few bytes up to 200KB. With NFS, the maximum packet size is 1,512 bytes, which produces a higher system load and longer transfer times. At Éclair, the SAN operates as a digital assets server with superior performance, enabling Éclair technicians to work at high resolution with 2K images and at 24 images per second with minimal wait time for asset transfer.

"The SAN with CXFS gives us great flexibility," says Soeiro. "It used to take several hours to import a single complete shot. We can now do it in 10 minutes. We are able to work more interactively and respond more quickly to our clients."

How Does CXFS Boost the Postproduction Workflow?

A typical movie postproduction involves several individuals using multiple applications working on the same content, each having a specific role.

During postproduction, original shots become digital assets that are moved and worked from one application host to another in a postproduction workflow.

From the original analog film to the movie theater, many steps are required. The original shots must be moved to digital, cut, color corrected, edited, and composited, as well as having effects added. Then, they must be transferred back to film and subtitled with final prints made for theatrical distribution.

Shots are transformed into very high-quality digital assets. For instance, one frame scanned at 2,000 pixels per line requires as much as 12MB of storage. At 24 frames per second, one second of film could easily represent more than 250MB.

Postproduction operators normally work sequence by sequence. With an average 30 seconds per sequence, several 8GB assets need to be transferred as fast as possible from one postproduction station to another.

To ensure there is no break in assets for postproduction, the workflow needs the fastest asset-sharing mechanism: SGI CXFS on a storage area network. With 200MB per second, the SAN is a perfect way to move large amounts of data through a workflow.

SGI CXFS offers a shared area where operators push and pull the sequence to be worked.

SGI, CXFS, and the SAN: A Powerful Combination

SAN and CXFS are a powerful combination enabling companies to concentrate storage at a single secure, high-bandwidth location. This configuration provides significant reductions in management and maintenance costs, plus it allows for optimizing the sharing of information and workflow processes. All users can share files in a high-performance consolidated storage space, which ensures timely access to information and eliminates the need for multiple file copies and complex version management. With the upcoming support for Sun™ Solaris™, Windows NT®, and Windows® 2000 environments in addition to IRIX®, CXFS provides the needed capabilities and environmental support to maximize organizational workflow and information management in heterogeneous IT environments.

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