White Paper

Digital Infrastructure Solution for Production

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1.0 Introduction

At SGI our priority is to ensure that customers' information is completely secure and instantly available. We handle the details of complex data management so customers can focus on what they do best.

Our data management strategy is based on providing high performance, total modularity, and reduced complexity. The key to optimum performance is flawless integration among the computational server, visualization engine, and storage bandwidth, to ensure that neither bandwidth bottlenecks nor scalability constraints will limit the production facility's ability to innovate. Modularity ensures that customers purchase only the capabilities needed and that they can trust that the solution will easily integrate, scale, and transfer to evolving infrastructure architectures. When it comes to data management, our goal is to reduce the complexity in a media environment.

SGI provides the ultimate in infrastructure solutions by combining industry-leading shared-filesystem technology (CXFS™), unrivaled bandwidth, scalability, high-availability tools, hierarchical storage management, the Data Migration Facility (DMF), and reliable backup capabilities.

1.1 Media Industry Requirements

Digital media content is growing and growing. Our customers are creating and/or converting more of their content into digital formats. More digital processes are being introduced into filmmaking (e.g., digital intermediates), and more versions of media assets are being produced: film, DVD, VHS, D-cinema, pay-per-view, broadcast, video-on-demand, Internet, and so forth.

1.2 What Is Fueling This Growth?

First: Digital media consumers are looking for variety. We have hundreds of channels of television available to our homes, with more being added continually. More feature films are being produced than ever before. Video and audio sales are at an all-time high. Media is now being distributed over broadband networks. Consumers are thus driving up the demand to the content owners and creators to keep more of their content available for remastering, redistribution, and reselling. And second: Disk capacities, costs, and packaging are improving significantly. Over the past two years, storage costs and form factors have reduced to a point where the content owners and creators are now able to make additional revenue by keeping their media assets online. The Universal Mastering concept (master once, distribute many) is becoming a standard workflow model, driving up storage requirements as the number of versions increases along with resolution of the master. This was made possible by the reduced costs and form factor of the latest disk technologies.

1.3 Changes in the Media Facility Landscape

The past five years have seen an amazing change in the post-production marketplace—in the tool sets available, in customer expectations and budgets, and especially in the business environment. The number of midsize facilities has dramatically decreased. Larger conglomerates have formed through acquisition and have consolidated operations. The past two years of decreased advertising revenues have further accelerated this polarized position, yielding two distinct camps: (1) the take-your-time, make-it-cheap, good-enough approach characterized by one-man bands working on Macintosh® systems in their garages, and (2) the fully interactive, time-is-money approach characterized by powerful real-time machines linked together in a large facility with extensive capabilities and resources. For those choosing the latter path, a powerful digital infrastructure is the key to ensuring that all facility customers see and appreciate the difference and are willing to pay for it. With facility customers continuing to demand lower prices and, in many cases, fixed project costs, the facility must turn to more efficient infrastructure solutions in order to remain profitable.

As large media facilities transition to a data-centric model, a new digital infrastructure is called for to overlay the existing videocentric (or film-centric) infrastructure. This infrastructure becomes more important as the tools migrate from purpose-built, specific-resolution black boxes to high-performance, general-purpose computers running media applications. Instead of distributing a specific standard and resolution of video, the facility distributes data, which can embody all variations of electronic media (spatial resolution, colorspace, bit depth and type, frame rate, compressed/uncompressed). The digital infrastructure must enhance workflow, create efficiencies, be utterly dependable, and be both flexible and scalable enough to allow the business to grow, explore new opportunities, and thrive. The unique hardware and software of SGI, coupled with the company's 20 years of direct experience in media, offer precisely this digital infrastructure.

The SGI® digital infrastructure consists of a highly scalable shared storage system with a common, shared filesystem, accessed by high-speed datapumps (servers) pushing and pulling data through efficient distribution systems linking all of the facility's resources, including legacy infrastructure and connections to the outside world. SGI offers multiple options in each of these areas, allowing customers to choose what is needed now while remaining confident that they can expand on the original infrastructure base without tossing

anything out and with virtually no limits on growth. The storage options include direct-attached storage (DAS), network-attached storage (NAS), and storage area networks (SAN) with real-time file sharing. Filesystems include the world's most powerful: XFS™ (extended filesystem) for stand-alone SGI environments, and CXFS (clustered extended filesystem) for shared heterogeneous environments that include computer systems from both SGI and other manufacturers. Server options range from powerful two-processor file servers to massive computational systems of up to 512 processors. And SGI offers the customer the flexibility to make appropriate choices of the best networking infrastructure through an impressive range of networking mediums and protocols, from Ethernet (and Fast Ethernet, GigE) to HIPPI, ATM (OC3 and OC12), Fibre Channel, and the high-performance GSN (Gigabyte System Network), capable of moving nearly a gigabyte of data each second over a single network connection. SGI has the knowledge and expertise to craft powerful and appropriate solutions from our hardware and software offerings, as has been proved time and time again in top media facilities around the world.

2.0 Facility Operations

2.1 Typical Workflow

Large production facilities typically have many artists, editors, colorists, and effects gurus working simultaneously on an as-needed basis on multiple projects. Sometimes the workflow is linear: once the first process is completed, it is handed to the second process, and the third, until the work is finished. But often, because of time and budget constraints and the artistic decision-making process, the workflow is more chaotic. Multiple stages occur simultaneously, and changes that force a rework of previous stages are common. The facility infrastructure must accommodate and embrace these realities by providing flexibility and efficiency amid artistic anarchy. For large projects, such as feature film effects, a number of facilities may be working on various effects "shots," and as the film release date gets closer, the need for facilities to share content files, often across geographic distances, adds additional challenges.

2.2 Input/Output

Typically, the content arrives and departs the facility as film or video. Video may arrive or depart in analog or digital form on tape, from cameras, via broadcast, satellite, fiber, and even over the Internet. More and more often, all the content eventually makes its way into a computer digital format (data available to be shared over the digital infrastructure).

3.0 Infrastructure Components

3.1 Clients

Clients of the digital infrastructure include film scanners and telecines; film recorders; nonlinear editors; graphics, effects, and compositing workstations; color correction and retouching systems; and video servers. Each of these clients must have access to the infrastructure, but not all clients are created equal. Some of the clients represent enormous capital investment; others process massive amounts of data. These clients require the highest-speed access to the infrastructure. Other clients represent less investment and/or processing power and so require a lower level of service from the infrastructure. As always, judgments and tradeoffs must be made in design and execution. Understanding the bottlenecks in the customer's production process will help determine where specific technology solutions need be applied in order to gain greater productivity.

3.2 Servers

Servers have two roles in a media facility: (1) computation (rendering, transcoding, etc.) and (2) distribution (real-time playback, file transfer, etc.). Quite often, an individual server will play both roles. Although Linux® OS-based servers have largely supplanted IRIX® servers in 3D render farms and noninteractive automated restoration applications, they cannot meet the growing requirements for a central, scalable, and reliable asset server. SGI servers remain the best choice in this role because their architecture allows them to scale with demand essentially without limits. These same characteristics make for an exceptional datapump, or distribution server. SGI servers come in two flavors: small (SGI® Origin® 300) and large (SGI® Origin® 3000). The compact form factor and the choice of I/O options (both digital media and networking) generally make SGI Origin 300 a more appropriate server in an infrastructure application. However, in film mastering facilities, especially those needing to move multiple film resolution projects simultaneously, SGI Origin 3000 is the right choice.

3.3 Filesystems

SGI filesystems XFS and CXFS constitute critical pieces of the infrastructure puzzle. These filesystems provide a powerful solution unmatched by any other filesystem in use today.

XFS is a robust, high-performance, 64-bit filesystem able to massively scale files up to 9 million terabytes and filesystems of 18 million terabytes. To put these numbers in perspective, a typical movie at 2K resolution is 2TB (2000GB), meaning a single filesystem could

accommodate 9 million feature films at the highest quality level used today. Although these astronomically large numbers do not reflect today's real-world needs, SGI has created an architecture capable of meeting any practical need and has the experience of supporting the largest single filesystem volumes in production, as large as 150TB and 50+ million files in a single filesystem. Although the competition routinely imposes real-world limitations on media customers, SGI provides an essentially limitless growth path. The XFS file journaling technology guarantees high reliability, while restarting in less than one second after an unexpected interruption, regardless of the number of files it manages. XFS delivers nearly the I/O performance of a raw filesystem, and when coupled with GRIO (guaranteed rate I/O), provides powerful solutions for real-time record and playout of HD video and even 2K film files.

CXFS adds to XFS the capability of sharing the filesystem and storage directly with other SGI servers and with other operating systems, including Windows NT®, Windows® 2000, and Sun™ Solaris™. Additional variants of UNIX®, as well as 64-bit Linux and 32-bit Linux, will be delivered soon, and other operating systems are under consideration. Sharing the data means unnecessary data motion is eliminated, thus reducing network traffic, congestion, and replication of storage. This shared filesystem is the key that unlocks the full potential of the SAN, permitting workflows in a media facility that foster speed, efficiency, creativity, and client satisfaction, as well as freeing up the facility to push through more work and drive up revenue.

4.0 Storage

The reduced costs and form factor of the latest disk technologies are quietly driving a revolution in the media business. Every day it becomes more practical to keep data instantly at hand, via hard disk storage and high-speed networks. The question becomes, which of the storage approaches—direct attached, network attached, SAN, or heterogeneous SAN (CXFS)—is appropriate for a media facility? In most cases a mixture of nearly all storage approaches will provide the best overall solution. Think of the storage approaches as a set of tools in a toolbox, each with different strengths and weaknesses, which, combined properly, can solve virtually any complex data management problem. By understanding each tool and the problems it best solves, SGI can craft a solution that works today and that can be scaled or modified to solve new problems as they crop up or as the infrastructure evolves. Because SGI provides a complete range of storage options, a solution can be crafted based on customer needs instead of making the problem fit the limited one-size-fits-all solution sets of other vendors.

4.1 The Data Access Bottleneck in Conventional Storage Architectures

As high-performance computing environments incorporated networked storage solutions, including NAS and SAN, their limitations became apparent in that neither provided sufficient access to data that media facilities require. We describe this as "the data access bottleneck." Figure 1 shows the three storage architectures available today—DAS, NAS, and SAN—and their respective data access bottlenecks. In response to this, SGI has developed the CXFS shared filesystem for SANs, which delivers near-instantaneous shared access to data from multiple computers and multiple processes within a workflow. CXFS combines the shared data access of NAS with the scalability and performance of a SAN.

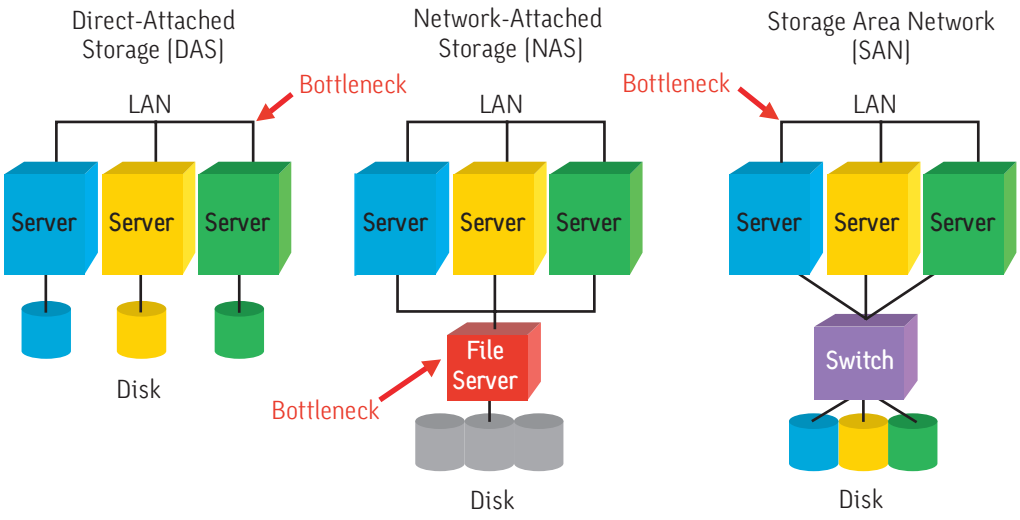

Fig. 1. The Three Main Storage Architectures

4.2 Direct-Attached Storage

Direct-attached storage is the simplest model: storage directly and exclusively attached to one computer. The strength of this model is that performance is very deterministic. Without competition with other hosts for the resource, consistent performance is assured. Direct attach is frequently used when guaranteed high performance is a must—examples being the Ciprico® Fibre Channel arrays or the Discreet® stone® storage system used in Discreet® editing and effects systems. The disadvantage of this model is that the storage cannot easily be seen or shared by other users within the facility, creating a data bottleneck. If another user in the facility requires access to the data stored on that server, it must be copied over the LAN using protocols such as NFS or TCP/IP. A terabyte-sized file, not unheard of in media environments, would take four hours to copy from one server to another over a 100Base-T Ethernet LAN, for example, assuming 100% LAN utilization. In many cases it takes longer to move data over the network than to process that data. The best strategy is to use the least amount of direct-attached storage required to meet job requirements. SGI® TP900, SGI® TP9100, SGI® TP9400, and SGI® TP9500 storage systems can all be used as direct-attached storage.

4.3 Network-Attached Storage (File Servers)

Network-attached storage is the simplest way to share storage within a facility. It typically consists of local storage connected to a file server that is connected to the network. Using NFS, CIFS, and assorted other programs, a file server can operate in a heterogeneous environment. Benefits include resource consolidation, easier management, and some scalability. File servers represent an excellent way to serve clients whose requirements are not particularly demanding or frequent. SGI Origin 300 makes a superb file server—as evidenced by rapid market acceptance. However, network-attached storage traditionally does not scale well. All file servers are limited in the number of clients that can be provided with a reasonable quality of service: If more clients are needed, then the data storage must be replicated or the quality of service compromised. By utilizing the shared storage in a CXFS SAN to feed the file server, many users can reap the rewards of a common pooled storage, thus eliminating a frequent data and workflow bottleneck within facilities. When file serving is required in a CXFS SAN, the metadata server is generally the preferred choice, both for economy and performance.

4.4 Storage Area Networks

Storage area networks are networked infrastructures designed to provide a flexible, high-performance, and highly scalable storage environment. SANs accomplish this by enabling many direct connections between servers, high-performance workstations, and storage devices such as disk storage systems and tape libraries. Leveraging Fibre Channel technology, SANs optimize the efficient transfer of block data, which is critically important for media tasks.

SANs help centralize data management, which greatly reduces overall operating costs. SANs also provide a way to add storage without the downtime and disruption associated with server-attached storage upgrades. With SANs, any computer on the network can access any piece of data on the network. But the architecture of ordinary SANs requires that each logical volume of storage be assigned to a single server. (This volume becomes the local volume for that computer.) This server manages requests from other servers for files contained within its assigned local volume. So, for a SAN connected to several computers, only one computer can ever have local access to a file. All other computers in the SAN must undertake a time-consuming process of copying files over the LAN to have access to the data in those files. This process is shown in figure 2. It results in slow shared data access, needless replication of files (taking more disk space), and management of replicated files-all costing time and money. A better solution is SAN with CXFS.

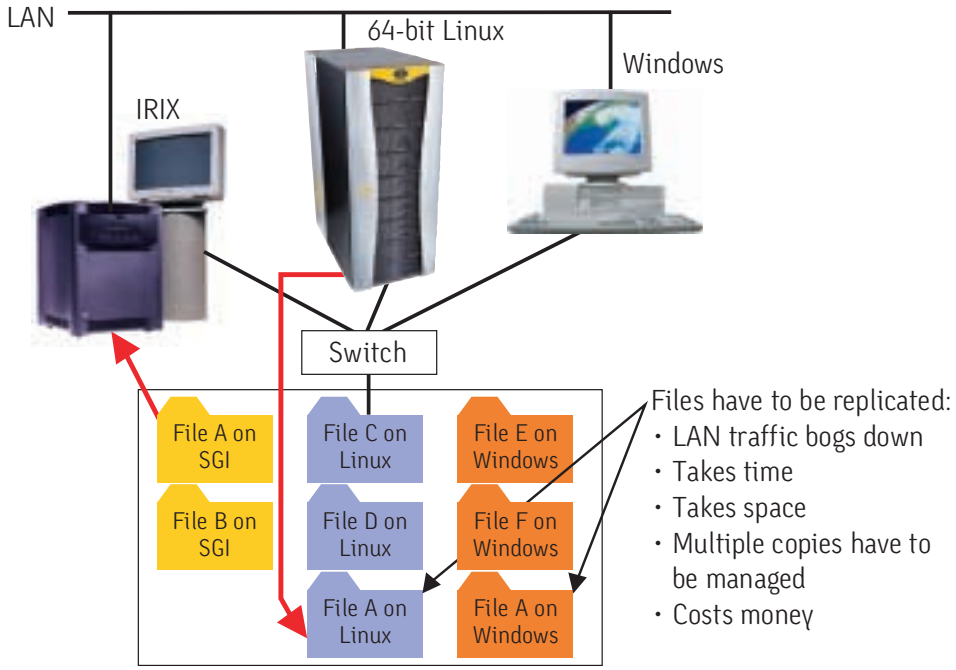

Fig. 2. File Copying in a Storage Area Network

4.5 SAN with CXFS

Although SANs offer the benefits of consolidated storage, centralized management, and a high-speed data network, CXFS enables true data sharing by allowing SAN-attached systems direct access to shared filesystems. A shared filesystem provides data access speeds well beyond those achievable via traditional methods such as NFS and FTP. This solves data-sharing bottlenecks common in media facilities and significantly boosts productivity when large files are shared by multiple processes in a workflow. Today CXFS supports IRIX, Windows NT, Windows 2000, and Solaris. Upcoming support includes 64-bit Linux and 32-bit Linux , as well as numerous vendor-specific variants of UNIX (IBM® AIX® and HP-UX®). Support for Mac® OS X is currently limited to file serving from shared storage via NFS and Samba®/CIFS.

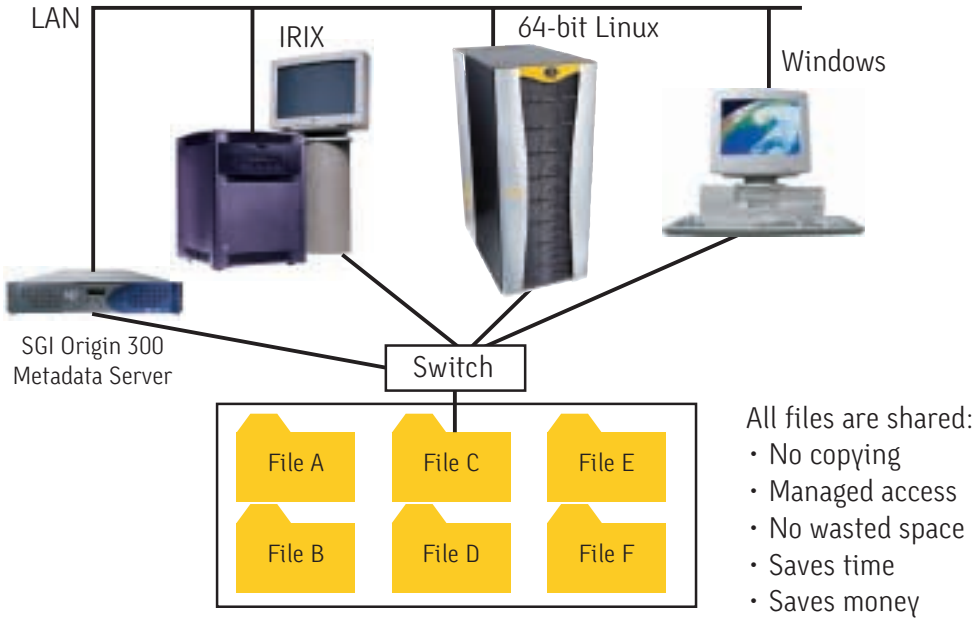

Fig. 3. SAN with SGI CXFS Shared Filesystem

Figure 3 illustrates a SAN with the CXFS shared filesystem. All files can be read and written to by any server in the SAN, as if they were their own local files. One system on the SAN acts as a metadata server, controlling file permissions and mediating shared access. Unlike network file sharing, where all data goes through the file server (which often becomes a bottleneck), once the metadata server grants access, systems with CXFS read and write data directly over the SAN to and from disk. Should a metadata server fail, a designated backup metadata server automatically takes over management of the CXFS filesystem. This feature, in combination with fully redundant SAN configurations and RAID storage, delivers extremely high availability along with exceptional performance. Even if failures occur, CXFS ensures that a path to access data is always available. CXFS eliminates copying of files over the network, eliminating the time and additional disk space required to do so.

4.6 Hybrid Storage Strategies

In the real world, rarely if ever will only one type of storage suffice in a large media facility. Combinations exist because each type of storage has benefits over the other types in certain applications. The most powerful model (see figure 4) is one with a CXFS SAN at the core. This centralized storage repository is accessed by CXFS clients both directly (A: expensive, high-performance tools such as film scanners) and indirectly through network-attached file servers (B: less expensive, lower-performance tools such as paint systems). In cases where high-speed, guaranteed-rate I/O is required, media clients will also have direct attached storage systems used to stage the data (C). An example is Discreet stone storage. With few exceptions, SGI system building blocks can be redeployed in different roles when circumstances require. Or, more likely, they can retain full functionality when other parts of the infrastructure puzzle are added as requirements grow. Whether infrastructure is built out with all the elements in place in the beginning or with elements added as dictated by needs or budgets, SGI provides the most complete, future-proof, end-to-end storage and data management solutions for complex creative workflow environments.

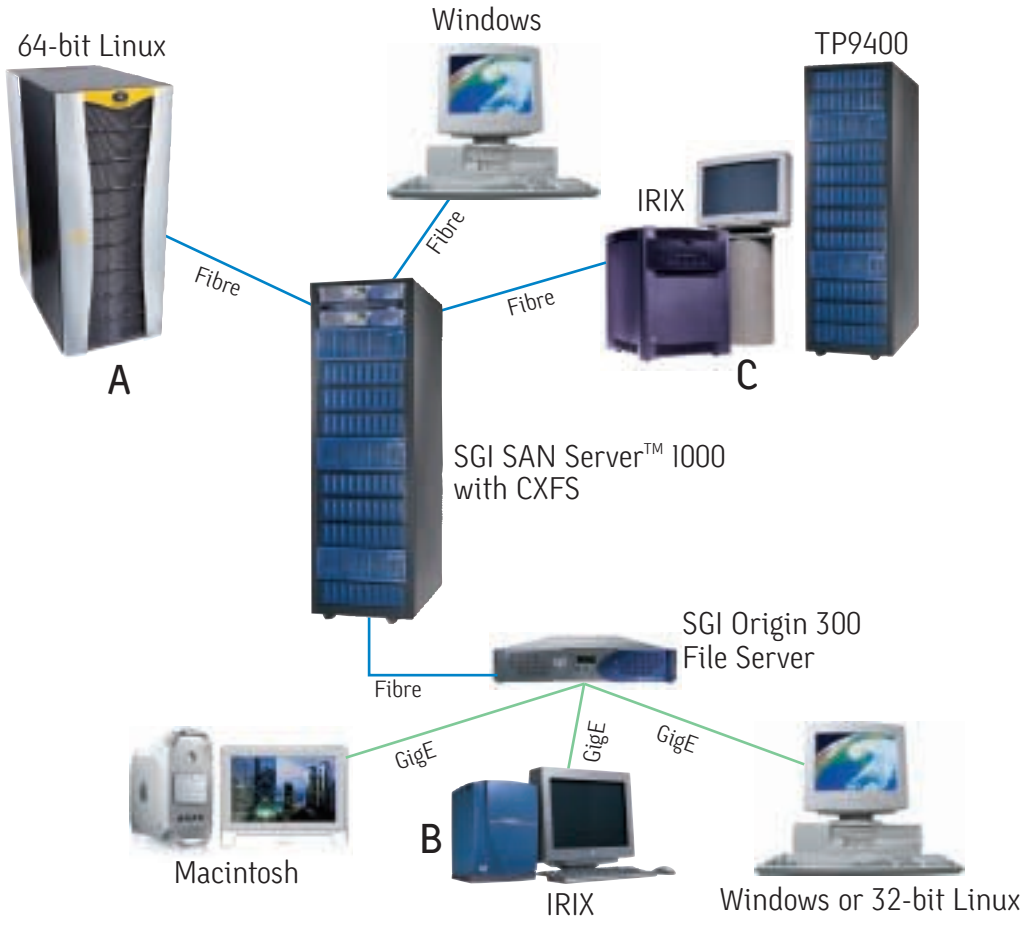

Fig. 4. Hybrid Storage Strategy Employs SAN, NAS, and Direct Attached Storage to Optimize Storage Costs and Data Access Speed

4.7 Hierarchical Storage Management with SGI Data Migration Facility

Major media facilities generate and manage massive amounts of data. SGI Data Migration Facility (DMF) helps manage this explosion of data. Although it is important to preserve the data, keeping it online indefinitely on the fastest disk drives, this is usually neither possible nor practical. Typically, media content is time sensitive. In a production facility it is important to keep data on fast disks while working on the content. Once completed, however, the data needs to be moved to less expensive solutions (either slower disks or tape). But who has the time to manage it? DMF provides tools to migrate data from online to near-line and back again—all without operator intervention and all based on migration rules that each facility sets. Although the data may move, it always remains available and appears online to the user. DMF is especially effective in scenarios that require the repurposing of content—such as film sequels or advertising campaigns that have recurring characters—where elements are reused or are required for comparison.

4.8 Backup

SGI offers a full complement of backup and restore products from Legato, including products to help manage offline storage. Core to these offerings is Legato NetWorker®, the most often installed backup and restore product on the market.

5.0 Network

SGI supports a variety of networking protocols ranging from Ethernet to GSN. The protocols encompass a wide range of data movement speed and a wide range of cost to match. As always, judgments and tradeoffs must be made in the design and execution, based on the importance of the task being performed. Unlike many other vendors, SGI is dedicated to reaching theoretical wire speed with all its interfaces, through both software and hardware. SGI understands that the rapid movement of data is essential within a media facility if maximum efficiencies are to be gained.

5.1 Fibre Channel

Fibre Channel is at the heart of any SAN and offers a flexible, reliable data network that meets the specific requirements of small to very large data transfers. With both 1Gb and 2Gb connections already deployed and faster connections on the drawing board, Fibre Channel is a fast and powerful networking technology. Optical fiber can be extended for great distances, and data can be stripped over multiple Fibre Channels for increased performance. SGI equipment can typically move 75 to 80MB per second across a 1Gb connection, and 150 to 160MB per second across a 2Gb connection. In film 2K and 4K applications, as well as some variants of HD, multiple Fibre Channels are a necessity even when using 2Gb-per-second Fibre Channel. Unless legacy requirements exclude it, 2Gb Fibre Channel is preferred over 1Gb because fewer host bus adapters, fiber cables, and switch ports are required to achieve the same bandwidth.

5.2 Ethernet/Fast Ethernet/Gigabit Ethernet

Ethernet is the ubiquitous standard for networking in business environments, although painfully slow by modern standards at a theoretical limit of 10Mb per second. Fast Ethernet is an order of magnitude faster, at 100Mb per second, and Gigabit Ethernet yet another order of magnitude faster, at a theoretical limit of 1000Mb per second (125MB per second). In practice, Gigabit Ethernet delivers about 60 to 70MB per second, due largely to the small packet size and the large overhead for the server as it fragments large files that must later be reassembled. Gigabit Ethernet is a good choice when many clients must access files but none have sustained requirements for large amounts of data—as in a render farm.

5.3 HIPPI

HIPPI is theoretically slower in speed compared with Gigabit Ethernet at 800Mb per second, although it tends to be considerably faster in practice because it is a point-to-point technology and does not require all the Ethernet overhead. It is, however, much more expensive to implement. HIPPI packets are much larger, and latency is not only very minimal but predictable, while in Ethernet it is not. HIPPI is good when reliable, real-time, high-speed transfers are needed. Many telecines utilize HIPPI connections to transfer data to computers and computer networks, including the Thomson Phantom Transfer Engine, which connects the Spirit DataCine™ to networks. Although HIPPI originally utilized a bulky copper parallel connection, today it is generally deployed as a fiber serial connection and can therefore be used over a longer distance (up to 500 m). SGI fully supports this international standard.

5.4 GSN

GSN, or Gigabyte System Network, is the functional equivalent of 8 HIPPI channels and has a theoretical speed of nominally 800MB per second, or actual speed on SGI equipment of up to 790MB per second, depending on protocol. GSN utilizes a parallel connection to achieve its high transfer rate and is limited to a maximum distance of 40 m. GSN is the networking technology of choice for very high-speed point-to-point connections, including the interface to the soon-to-be-released Thomson Spirit2 DataCine, which will permit near-real-time transfers of 2K film resolution content from the scanner to the network. Although expensive to implement, GSN is often the only solution to the really difficult data movement problems existing today.

5.5 ATM

SGI supports both OC3 and OC12 ATM protocols designed for local area networking and system area networking and connection to wide area networks. ATM is particularly useful when streaming video over long distances. SGI sells four-port OC3 adapters as well as single-port OC3 and OC12 adapters.

5.6 Success Stories

SGI has already developed CXFS SAN solutions for more than 200 customers worldwide, and there is great interest among media facilities. Among the media clients embracing CXFS SAN are Laboratoire Éclair and EFilm. The Efilm story follows.

6.0 EFilm Digital Film Mastering Huge Success in Hollywood

EFilm, a joint venture of Panavision and Deluxe Laboratories, has created a highly successful digital replacement for the process of creating film intermediates used to strike the final movie release prints shown in theaters. Hollywood has embraced the innovative digital intermediate process, selecting EFilm to digitally master many of this year's hottest movies, including *Spy Kids 2, Crocodile Hunter, XXX, Blue Crush, Frida,* and *25th Hour*. SGI® Onyx® 3400 visualization systems and a CXFS SAN infrastructure play critical roles in solving the processing and workflow issues resulting from such massive data sets.

While the video and television production world has enjoyed the benefits of real-time digital color correction for many years, the technology simply did not exist to do the same thing for feature films. It is much more difficult to scan film with acceptable fidelity and then store, move, and process it fast enough to create a truly interactive experience for the colorist and the director of photography. With 15 years' experience using SGI computers in the film industry, EFilm President Joe Matza turned once again to SGI. "Our technology team selected SGI because it's the only supercomputing company that can provide a robust development environment and handle our high-speed data requirements. The graphics processors in SGI Onyx 3400 systems allow us to display our images at up to 2K resolutions and in real time," said Matza. "We need to move a lot of data extraordinarily fast to meet our clients' needs. SGI systems, in combination with our proprietary ELab software and hardware, allow EFilm to design and configure multiple systems for multiple tasks. We are not trying to build a single suite but rather multiple systems, each working on a different project with a number of parallel processes all happening at the same time. SGI met the spec we needed."

The infrastructure that EFilm and SGI created efficiently handles massive data sets with rock-solid reliability and possesses the inherent flexibility to allow changes in workflow dictated by both operational and business considerations (as in: business is exploding!). Film elements are ingested through several Imagica XE Film scanners at 2K resolution (2048x1556 10-bit logarithmic) and relayed to the SAN, comprising SGI TP9400 storage and Brocade Fibre Channel switches. Film frames are exported to other facilities for visual effects, opticals, and titling and then imported back into the SGI SAN upon completion. A 1K film proxy (1280x1024, the native resolution of the DLP projector) is created of all the film material for use in the ELab™ process. Three DLP projection theaters pull 1K proxy images off the SGI SAN in real time into SGI Onyx 3400 visualization systems, where the images are "timed" using primary, secondary, and lab-light equivalents under the direction of the film's director of photography. SGI Onyx 3400 also provides a "film-stock emulation" color conversion in real time that gives a very close approximation of the final film image while digitally displaying the images via DLP projectors. When "timing" is complete, the full 2K images are rendered to the SAN based on decisions made by the filmmakers while using the proxies.

Multiple Arrilaser film recorders write out to film the entire movie, creating a master IP (interpositive) or IN (internegative), from which the film release prints are struck. The digital process eliminates multiple analog steps between shooting the film and presenting it at the local theater, yielding a much higher-quality print. The final 2K movie can also be accessed via the SAN and down-converted/modified for distribution via VOD, DVD, in-flight movies, and videotape.

"The most important aspect of digitally mastering feature films with this new technology is that it presents a new visual palette to the director of photography and the director," said Matza. "Primaries, secondaries, multilayered windowing, and a multitude of other powerful visual processes all become part of the tool set for the feature filmmaker. Bottom line, creatives and producers can now bring better content to the screen. The SGI visualization systems and storage and the fundamental flexibility of the SGI architecture system have played an important role in helping EFilm make all this happen."

Because of the excellent customer response, EFilm has begun an upgrade phase to add additional capacity. In addition, EFilm's parent companies plan to expand its operations both domestically and internationally.

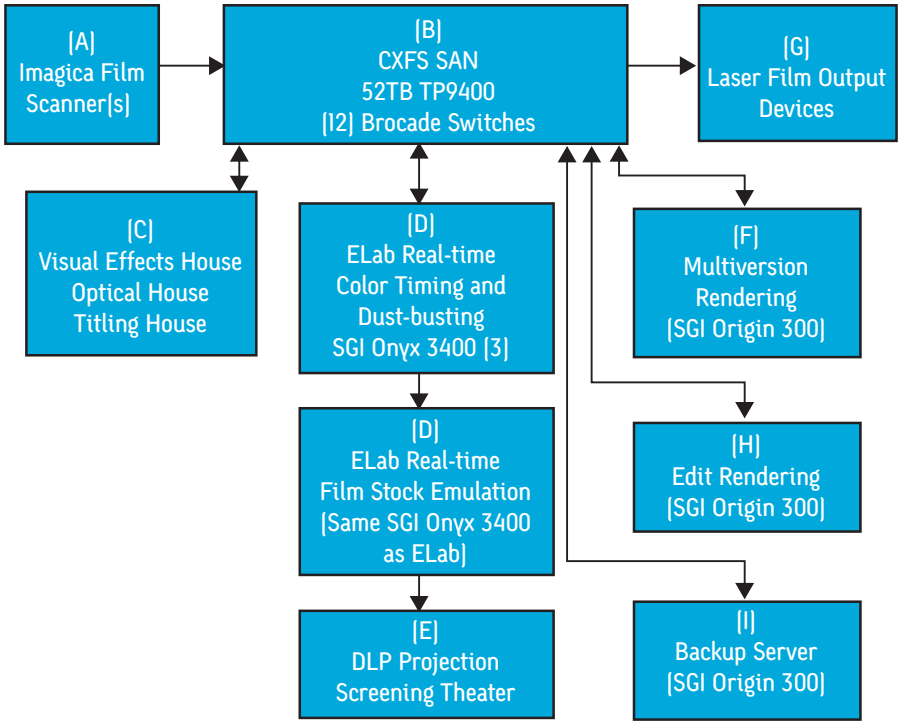

Fig. 5. EFilm Configuration

7.0 EFilm Configuration Details

[a.] Imagica XE Film Scanner[s]: 2048x1556 pixels RGB, 10-bit log/frame
[b.] SGI CXFS and SAN [TP9400 storage and Brocade switches]
[c.] Images exported to effects, opticals, and titling houses, then imported back into SAN
[d.] ELab, EFilm's proprietary software system, which incorporates primary, secondary, and lab lights, as well as film-stock emulation running on SGI Onyx 3400 visualization systems with multiple graphics pipes
[e.] Digital Projection Theater[s], Barco DLP projection [1280x1024 resolution, nominally 1K]
[f.] Multiversion rendering, SGI Origin 300 servers
[g.] Arrilaser film recorder[s]
[h.] Edit rendering running on SGI Origin 300 Server
[i.] Backup SGI Origin 300 backup servers

8.0 Summary

SGI is uniquely positioned to assist media facilities as they migrate from a "video-centric" to a "data-centric" digital infrastructure. Twenty years of leadership in the media industry, coupled with a comprehensive range of computing, networking, and storage technologies, make SGI the obvious choice as a partner to media companies. With a digital infrastructure based on SGI technologies, not only can the tasks of today be accomplished with flexibility and efficiency, but the entire system can scale essentially without limit and adapt to changing needs and technologies, all the while fully utilizing and leveraging the existing investment in infrastructure.

The movement to a "data-centric" environment is arguably inevitable for media facilities. The additional efficiencies that the infrastructure provides, combined with the greatly simplified workflow and dramatically eased scheduling flexibility, afford a huge competitive advantage that translates to lower costs and greater revenues, positively impacting both the top and bottom lines.

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