STORAGE SOLUTIONS

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Post Magazine

Communications
"Our Goal Is Your Success"

Storage:
Industrial Sex Appeal

Making the right match is key. **By Christine Bunish**

RTVF's Chris Magid: The studio worked on the doc *100 Years of American Energy*, as well as on a marketing video for Suresmile.

"Storage isn't sexy or glamorous — it's infrastructure. For anyone doing a volume of work today, storage is the heart of things," says Chris Magid, president of Renaissance Television & Film (RTVF), based in Dallas.

Then he rethinks the "storage isn't sexy" part of his remark. "Storage is the gritty, Harley stuff, the muscle-car stuff. It's what separates the men from the boys, and there is an industrial sex appeal to that. The wrong choice can destroy your business."

RENAISSANCE

RTVF (www.gortvf.com) is a full-service production company for television programming, commercials and corporate projects that's "very leveraged in post," says Magid. "Today, production doesn't necessarily end when you get in post. In a way, the back half of some new cameras is the edit suite. Files from Red One, Arri Alexa and DSLRs need processing to be edit-ready. Transcoding, creating proxies, baking in proper color and keeping large original files eats up storage. Transfers should happen fast without storage issues getting in the way."

RTVF does "a heavy load of high-end political spots every other year — we did maybe 200 spots last September and October," he notes. "They're very deadline-oriented and mission critical."

The company adopted shared storage "as soon as it was a viable option," using Avid LANshare for multiple seats of Avid Symphony and Media Composer. "When we went all-online-all-the-time we got a Facilis TerraBlock system, an early cost-effective SAN system outside of what Avid was providing," he says. "We were after maximum throughput, and we felt Facilis offered it."

RTVF has upgraded its Facilis solution several times; it bought a new TerraBlock 24D last year and retired its old system. "People usually don't feel a need to keep up with storage advancements," Magid observes. "It's like an appliance you buy and then forget about because it does its job well for a few years. But like most technology, progress is constant and better systems are always available."

The TerraBlock system offers the high speed that RTVF needs for HD post, the security of knowing data won't disappear in the event of a failure and the flexibility

to work in "any room, any time, with any material," he says. "It's also easy to administer and well suited for a small- to mid-sized facility. It doesn't require a lot of ancillary gear to work with it: We have 8GB Fibre connections for six Avid seats without going through a hub or switch."

Magid notes that while the TerraBlock is "one of the less-expensive options" available, "it does some things better than other systems. It's very quick and robust in volume-level sharing, something not offered in all SANs, and that's our workflow most of the time. And it gives us the option to grow. We're at 42TB now, and a single unit scales to 48TB; you can also daisy-chain multiple servers for more storage space and add gear to support more clients."

File-sharing is offered via a multi-user write feature. Magid reports that it is a simple, flexible approach, but when compared to the traditional volume-level sharing, there is a performance penalty.

Whether companies choose Facilis TerraBlock or systems from other manufacturers, Magid suggests opting for a turnkey solution. "Don't cobble together hardware from one manufacturer, SAN software from another and a switch from a third," he says. "Go with a real turnkey system rather than home brew."

Magid expects to see major developments in storage soon. "For years the sensible way to get the highest performance was investing in a Fibre SAN," he says. "But technologies like Light Peak have the potential of delivering local storage connection speeds of 10 gigabits-per-second or better, at low cost, using simple interfaces. So, I wonder how SAN manufacturers will take advantage of these breakthroughs."

SINKING SHIP

Toronto's Sinking Ship Entertainment (www.sinkingship.ca) has carved out a new niche in children's television: live-action shows focusing on kids first, "almost reality TV for pre-schoolers," says producer Matt Bishop, one of the company's founders. Sinking Ship now has 15 seasons of nine series, including their first, *This is Daniel Cook*, with a six-year-old host who explores everything kids are curious about; *Are We There Yet?*, a siblings' world-travel show produced with National Geographic; and *Dino Dan*, their first scripted, combo live-action/animated show for Nick Jr. that Bishop describes as "*Jurassic Park* for kids."

Working with children, Sinking Ship typically shoots "a lot of content — the cameras are always running since you never know when a kid will uncover something magical," says Bishop. The company currently uses Red One cameras for *Dino Dan* and Panasonic HPX300s for its travel series.

"Our storage needs are gargantuan — for offline, audio, VFX," he reports. "We used to do a show on a 500GB LaCie drive, then collected Pro Avio E-SATA boxes. We've constantly evolved our storage which, thankfully, has come down in price. That means we can continue to put more money on the screen."

Shinking Ship's Matt Bishop: *Dino Dan* is just one of the shows they work on.

Sinking Ship purchased a 24TB Small Tree GraniteStor ST-RAID last May, a direct-attached storage solution for Mac OS X. "Once we switched to Small Tree, we were able to balance many projects because they can all sit in one home: editors can be cutting offline or online on Final Cut Pro, artists can be doing VFX on PCs running Autodesk Maya, the audio engineer can be recording and mixing — they all share the same media."

The company initially planned to use the Small Tree system for offline only. "But with *Dino Dan* we've now got the CGI team rendering to it," Bishop says. "To save costs we used Ethernet runs out of the back of our new Mac Pros so everyone has his own direct attachment to the storage. We were also able to plug our VFX artists and their PCs into the system. The price point and reliability of the Small Tree have been unparalleled. We never turn it off and it's never gone down — it's been rock solid."

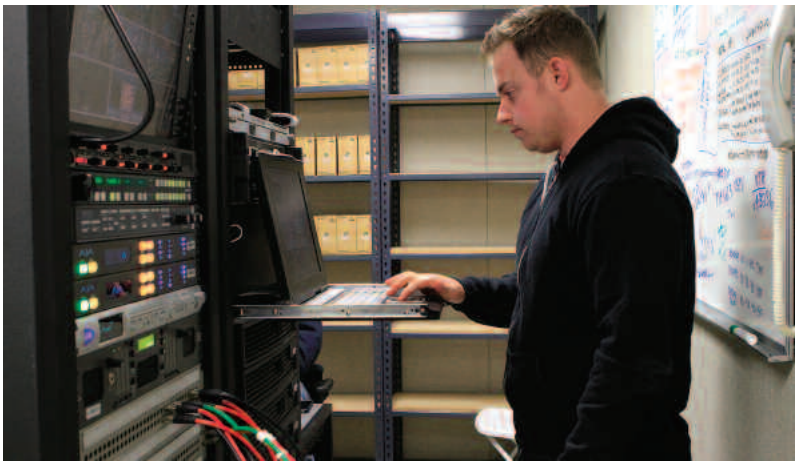
Sinking Ship delivers HDCAM SR masters for broadcast using Apple ProRes 4444 and archives to Quantum LTO tapes, which are stored offsite.

"The Small Tree ST-RAID is easily expandable without a massive investment, and we'll probably grow to 100TB soon," adds Bishop. "One of our biggest compliments was a [back]-handed one: A fellow producer said we were doing a disservice to the industry by showing what could be done for less [cost]. We just believe that it's important to think outside the box."

LOPEZ TONIGHT

The TBS late night show *Lopez Tonight* relies on Avid Unity ISIS on Gigabit Ethernet to meet the fast-turnaround demands of the daily talk and entertainment show shot in front of a live audience at Warner Bros. Studios.

The live-to-tape production is captured by Avid AirSpeeds for ingest and transferred to the Avid Unity ISIS via the Avid Interplay media asset management environment; in addition the



***Lopez Tonight*'s Brady Betzel.**

show is recorded to Sony XDCAM HD at 50Mb/s to furnish a hard copy backup. Avid Interplay enables editors Stephen Lutkus and Kurt Heydle, working in a post trailer outside the stage, to drag clips into the bins of their two Avid Media Composers.

"Avid Unity ISIS gives us the shared storage we need and works well with Interplay, which allows us to have stations where producers can watch clips and sequences, and put notes on them without standing over our shoulders," says assistant editor Brady Betzel. "With Avid AirSpeed there's no separate digitizing step, so we can move quickly: There's only a :30 delay from the stage so we can begin editing immediately and turn the show around in about an hour."

In cutting *Lopez Tonight,* the editors "stay as close to the director's vision as possible, keeping the excitement of a live show," he reports. Editors quickly polish the show in the hour given to get the program on air. "They remain faithful to the show's format while keeping true to George Lopez's sign off at the end of each *Lopez Tonight* production, "You've just seen the baddest show in late-night. Good night!" says Betzel.

The workflow and storage system was established when the show bowed in November 2009. "Telepictures set us up with the newest great equipment," says Betzel. "Avid Unity ISIS has worked flawlessly for us; it's definitely helped us never be late."

An Apple Xserve acts as "a bridge between us and production," dishing out clips and graphics, he notes. Editors use the Media Composer's transfer engine to send cut sequences to the tape operator's Grass Valley K2 Summit so he can roll them into the show. "That's handy and quick," Betzel says. "We can send a whole clip to the stage

within a minute or two."

Betzel plays out each act of the show from his Media Composer for satellite uplink to TBS in Atlanta. "Sometimes the editors are still cutting while I'm feeding the show," he notes.

The consistent demands of *Lopez Tonight* are likely to keep storage solutions in place for a while. "We have shows from the current week and the week before online, so I'm deleting everything over two weeks old and keeping the demands level in the Unity," Betzel says.

UNIVERSAL STUDIOS

Universal Studios' new Universal Virtual Stage 1 (UVS1) in Universal City (www.filmmakersdestination.com) is a dedicated pre-rigged, pre-calibrated virtual production environment with motion capture, camera tracking and related technologies for commercials, television and features. The stage has a 40x80-foot greenscreen cyc and an attached production suite featuring 60TB of high-speed Isilon storage.

"We designed an integrated production facility, one place to manage the entire front-end production process," says technical director Ron Fischer. From set previsualization to shooting on stage to directly feeding editors after selects are chosen, the demands of UVS1 on a storage system "are a bit unique," he concedes.

"A facility like this requires very fast ingest onstage for recording of live action with greenscreen, for the 4K digital master, and for editors who want quick access to selects," he says. A fiber-optic connection also delivers two streams of uncompressed HDSI video at "near-theater resolution" to Universal's on-lot Digital Services group for dailies playback.

UVS1 opened in December and has been running tests with clients preparing for productions. The production suite is equipped with an Isilon system offering six 10TB storage nodes each, plus two accelerator nodes; the storage solution is easily expandable to meet future needs.

"We're using the latest generation Isilon here," says Fischer who has a long history with storage systems of that type from previous stints with Sony Imageworks and Imagemovers Digital.

UVS1 has six artistworkstations in its artists' suite and three more workstations onstage running Autodesk's Maya, and MotionBuilder, The Foundry's Nuke and Studio GPU's Mach Studio for previz. Digital scenes are sent to the stage for the shoot with live talent and high-speed ingest by the Isilon system. "It's primarily digital negative and digital workprint, 1080p and 4K and 2K off a Red One or another digital camera," Fischer explains. "You get to see onstage the digital negative composited with the background; you see the timing and framing — we demo'd this on our opening night."

The onstage material is then "ingested quickly" to feed two Avid Mojos and an Apple Final Cut Pro system in the attached editing bays, and later live streamed for dailies.

Fischer notes that it was the studios' plan "to have a virtual stage that was ready to go. Although we don't staff the facility, we provide a toolbox for the client that's adaptable to a production and within a production. Their own artists and operators

The Mill chooses multiple options

LONDON — The Mill (www.the-mill.com) in London uses different storage solutions for different needs, but when using Autodesk's Smoke on the Mac, the studio opts for a 6TB LaCie 12big Rack Network. Smoke is used for commercial editing, finishing and VFX at the facility.

"We've had the LaCie for about 18 months," says senior engineer Adam Coles. "With Smoke now on Mac, you're no longer tied into the hardware turnkey solution. You can buy whatever storage you like. The 12big Rack was suggested to us by our Smoke software vendor." Another "deciding factor" was the unit's fault tolerance. "It has a hardware RAID-5 configuration

and fault-reporting software, so we can continue to work in event of a failure," he adds.

Used in a workflow in which it's dedicated to the Smoke, the storage system "is not taxed too much," he admits. "But it has to work day in, day out, and it's been performing fine. The 12big Rack has two 4GB Fibre links into Smoke, so there's more than enough bandwidth."

Coles says The Mill is outfitted with many other storage solutions for different applications, including BlueArc's Mercury storage for VFX-heavy jobs. "We've used BlueArc for some time, initially in the UK on projects like Nike's *Write the Future* and now in our US offices. Whilst the performance and reliability that the BlueArc equipment provides are our primary drivers for using this equipment, the high level of technical and sales support we receive has always reassured us," says Steve Smallwood, engineer at The Mill in London.

Two clustered BlueArc Mercury storage systems were used in creating the VFX for *Write the Future,* a three-minute Nike ad from Wieden+Kennedy/Amsterdam directed by Alejandro Gonzalez Inarritu that captured attention during the 2010 FIFA World Cup. The Mill's VFX team worked on 236 shots, including crafting a CG stadium, replicating the crowd, rotoscoping the players and creating a fully-CG satellite and Earth matte painting.

The Mill also has Autodesk-branded storage, Apple's Xsan and DVS and Isilon systems. — *Christine Bunish*

bring the facility to life."

Although UVS1 does one production at a time, one of the attractions of the Isilon system is that it is partitionable to keep multiple productions in storage simultaneously. "We can have a production load in on Isilon while the next production is operating on the stage and another production is pulling material off the Isilon for editorial," Fischer explains.

ClearCube's Teradici PC-over-IP technology enables all the workstations in the production suite to pick up or drop any keyboard or display, he notes. "It remotes the keyboard, mouse and display over the network connection adding versatility to what we can do."

MODERN VIDEOFILM

At Burbank's Modern VideoFilm (www.mvfinc.com), a pair of Omneon MediaGrids performs very specific functions. A MediaGrid CSS 1042B unit handles incoming and outgoing cache storage while a MediaGrid 2124 serves as production storage.

"Almost without exception the episodic and feature projects that arrive at Modern VideoFilm via file transfer system go through the MediaGrids," says senior engineer Bill Womack. "Projects land on the MediaGrid on the way in and on the way out and during production.

"We have 7-10TB a day coming in over private Fibre and the Internet, many feeds simultaneously. MediaGrid was the only solution we found that could cost effectively support multiple, high-bandwidth transactions at speeds high enough not to impact clients loading projects. MediaGrid has immense write speeds for a large number of clients: That's where it really shines."

Clients upload episodics or features to MediaGrid using our Signiant or Aspera file automation systems. Then material moves off Modern VideoFilm's MediaGrid 1042 and into production on the MediaGrid 2124, or another content server, for realtime playback, editing or realtime encoding.

Finished projects are delivered back to clients via the MediaGrid 1042. "We can't control when the end user decides to download finished work, so jobs may clump up," Womack explains. "The MediaGrid acts as an outgoing cache supporting many high-bandwidth distribution transactions."

The need for a content-serving solution became apparent as the company moved into new business areas, says Womack. "We tried other manufacturers' equipment for incoming cache, and MediaGrid performed best in that application. We've been using them for a couple of years now and keep expanding them. They are extremely easy to scale — it takes an hour to add new storage nodes to the cluster."

He expects even more of the production workflow, such as capturing realtime data off of Apple's Final Cut Pro or doing faster-than-realtime transcod-

ing, will move onto the MediaGrid. "We'll continue to expand its media functions. We're always trying to figure out how to optimize workflow, and MediaGrid is extremely flexible in fitting into workflows."

LEGEND3D

San Diego's Legend3D (www.legend3D.com), a 2D-to-stereo 3D conversion studio, has seen client-review station storage demands skyrocket for its file-based workflow.

"We've tripled the requirements for holding a standard-size movie," says systems supervisor Jack Greene. "We watch the work in motion, uncompressed; we need to see the movie just as the viewer will see it."

Legend3D was introduced to Rorke Data's Galaxy Aurora by Iridas, whose FrameCycler DI is a key tool at the studio. "We tested a 20TB Galaxy Aurora as direct-attached storage for a client-review station," Greene recalls. "We loaded in the work overnight and were able to play back stereo in realtime."

One of the challenges, he says, is stereo 3D's need to deal with "12MB files for each eye, so we're talking about six times the requirement for playback of HD versus our old colorization projects. You have to have fast computer I/O so you're not waiting for files."

Cost was another important consideration in selecting a storage solution. "Aurora was the only reasonably-priced system we found that could do the job," says Greene. "There were some other solutions out there, but nothing we could afford to put on seven client-review stations — and we plan to increase that number to 17 stations."

Legend3D uses Isilon for primary and nearline storage. "Between 350 and 400 artists hit the storage; most work locally then check back in at the end of the day when editors put completed files on the timeline in Aurora for review by stereographers and VFX supervisors," he explains.

The company invested in a pair of Galaxy Auroras when it began working on *Alice in Wonderland*. "What was remarkable was that the system was pretty much a plug-and-play solution," says Greene. "Out of the box it was able to do 2K stereo in realtime."

Galaxy Aurora has become the standard for review station storage at Legend3D; four more systems are on order. "We're also working with Rorke and FalconStor to come up with a SAN solution to use the same timeline across multiple workstations automating the process for a number of Auroras."

Visit postmagazine.com for our sidebar on LTO storage options.

A *'cloudy' future* for post production

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Why cloud storage?

Using remote resources through the Internet is often referred to as utilizing assets in the clouds. These resources can be under the control of an enterprise with limited access and are then referred to as a private cloud or available to a broader public, in which case these assets are in a public cloud.

Many cloud implementations are a form of outsourcing, where the hardware and most of the asset management software are located in an aggregated datacenter. These shared resources can also be in an enterprise's own datacenter and under their direct control and management. Hardware resources that can be shared in a cloud include computer processors and digital storage.

Hardware virtualization has driven the modern growth in the use of hardware clouds. Hardware virtualization allows more efficient use of hardware assets. In the case of digital storage in the cloud this virtualization as well as additional features, such as de-duplication allow better storage system use. These factors reduce the bandwidth demand for operations such as back-up and can also reduce the recovery time for back-up data. These concepts, developed originally for IT applications, may be ideal for some functions in modern digital workflows. Taken together, remote datacenters with well-managed storage systems can achieve cost efficiencies that are difficult to achieve with locally-managed assets.

PRODUCTION & DISTRIBUTION

Cloud storage is getting traction as a cost-effective approach to modern post production workflows. While the latency of remote access through the Internet may limit the use of cloud storage for direct creative editing, cloud storage can be used for compute intensive operations, such as rendering, transcoding, content distribution and archiving. Using out-sourced cloud storage, organizations can keep their media assets in a centralized managed repository and pay for storage capacity and management as the asset library grows.

Assuming that the cloud storage provider does a good job of data protection and management — a critical feature for long-term media assets — cloud storage may be a cost-effective solution for smaller production facilities that cannot or do not want to invest in the complexity of local archive storage infrastructure. Assets stored in cloud storage also offer advantages for workflows conducted across multiple time zones and locations since the content can be accessed anytime and anywhere.

Companies offering either storage systems and/or services for cloud-based content access for digital workflows and content distribution include Nirvanix, DataDirect Networks, EMC, Oracle and NetApp (to name only a few). Figure 1 shows an example of a distributed region-based content delivery network for either collaborative workflows or for content distribution can be built in the cloud.

In addition to consolidated storage assets, cloud providers also offer remote compute services. This combination is very useful for cloud-based rendering as well as conforming and assembling content. Modern rendering requires the latest server and storage devices, and these expensive services are generally only needed for a short time during most video production projects. Thus leasing time on a cloud service makes a lot more sense than, for instance, buying and maintaining a high-end rendering facility.

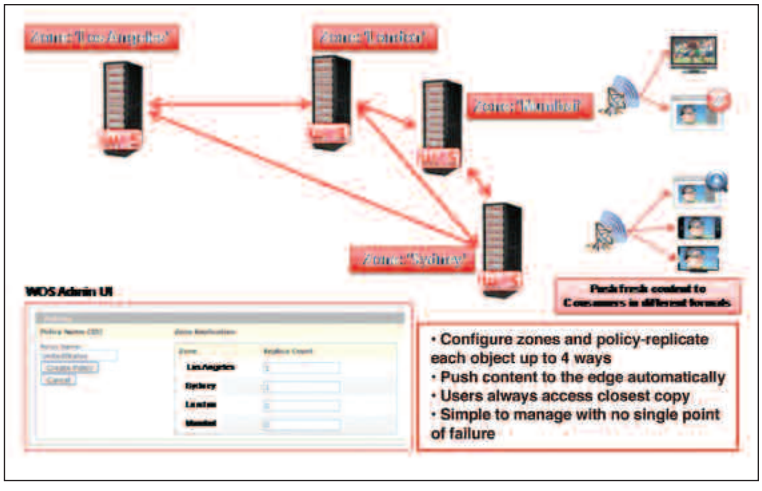

Figure 1. Distributed collaboration or content distribution across geographic regions.

PROVIDED BY DATADIRECT NETWORKS

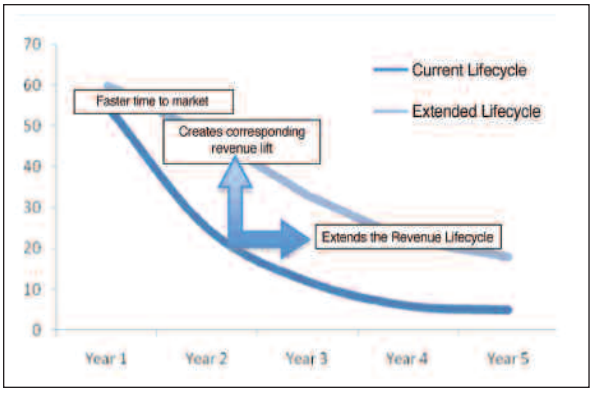

Figure 2: Increase in revenue due to an extended content lifecycle with online content.

AUTOMATING THE DIGITAL SUPPLY CHAIN, MARCH 2010, CONTENT BRIDGE WHITE PAPER

Encoding content and delivering that content is the path to monetization of the content. Storing and delivering content across the Internet is one of the biggest uses of cloud-based storage. Companies such as www.encoding.com and Content Bridge offer transcoding services for the 300 or more distribution formats now in use. Figure 2 shows that additional revenues may be expected due to a longer asset life cycle for online content.

KEEPING CONTENT FOR THE LONG TERM

There are efforts underway to enable very long-term data retention in cloud storage. Efforts by the Active Archive Alliance (www.activearchive.com), SNIA (www.snia.org/forums/dmf/programs/ltacsi/100_year) and organizations directly associated with the media and entertainment industry, such as The Academy of Motion Pictures Arts and Sciences and SMPTE are working on methods and standards for long-term archiving of digital media assets. Many of these efforts could be or are directly targeted for long-term retention of media assets stored and accessible through the Internet. Recently the SNIA Long Term Retention Working Group teamed up with the SNIA Cloud Storage Initiative to come up with protocols and standards for archiving content in clouds.

Cloud data management using object storage allows a richer and more extensible environment for metadata associated with the content, making the content easier to organize and use. Using a standard interface for object storage in the cloud such as SNIA's CDMI provides a more scalable way to handle large libraries of content in an archive.

The apparent latency of Internet access can be hidden by using local cloud storage gateways, which offers a NAS-like front end access to the cloud storage for uploading and downloading content as needed. Increasing access to fast WAN and MAN networks has also improved online content access. Ingest and data delivery of TBs per day are possible on modern Internet networks. For really large content files, physical shipping of storage devices may be much faster than uploading the content. Such cloud storage gateways make implementation of cloud storage as a secondary and tertiary data silo possible and efficient.

Companies providing cloud-based archives include Content Bridge, which does encoding, provides a content library for content distribution and also provides an optional online archiving service for the master distribution content, and Canto (using the Archiware PreStore service). Nirvanix, one of the most out-spoken champions for video content in the clouds, is used by NBC Universal for their digital master content storage.

Figure 3 shows the relationship of local storage and the digital content masters in the cloud. Lossless compressed content of over 1.7 petabytes is currently in this system, up from 40TB a year ago. New content is being added at the rate of about 7TB/day.

LIFE IN THE CLOUDS

While hardware clouds are not the cure to all ills of video production, it may be a cost effective path for access to professional services, long-term managed archives as well as content distribution. This is a fast developing area and it remains to be seen how far cloud-based services can extend into the video production workflow.

Coughlin Associates provides digital storage and applications consulting, storage industry market and technology analysis, and conducts conferences focused on digital storage and applications.

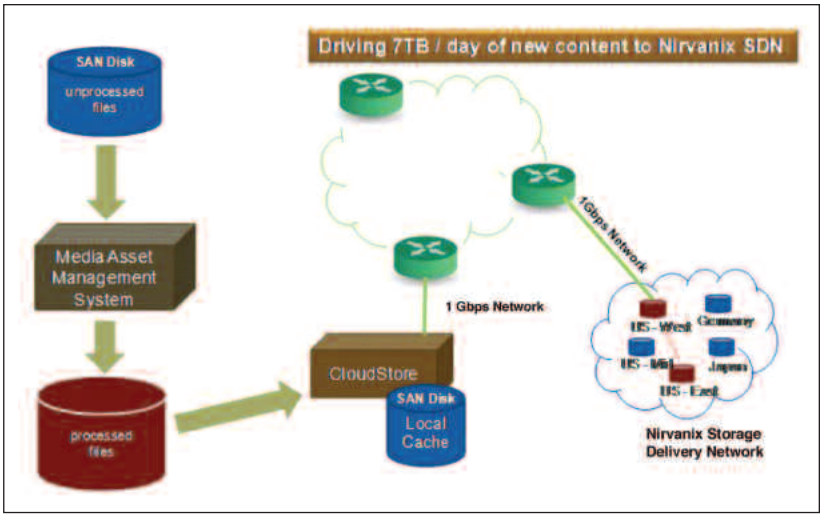

Figure 3: Distributed collaboration or content distribution across geographic regions.

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