



(CLOCKWISE FROM TOP) FACILIS, G-TECHNOLOGY AND PANASAS



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#### NAB Booth SL 11127

PROVIDERS OFFER THE M&E SPACE A WIDE ARRAY OF HIGH PERFORMANCE, HIGH-CAPACITY SYSTEMS BY CHRISTINE BUNISH

t's understandable if post professionals have a hard time making up their minds about which storage solutions best fit their needs. After all, there are numerous options available that can meet both a studio's immediate and future needs. It's important for post pros to think about a system that can not only address the types of projects they're working on now, but one that will also grow with them to handle 4K, 8K, high frame rate and HDR workflows. Here's a look at some viable options available today or that will be introduced at this year's NAB show.

#### PANASAS

Although Panasas (www.panasas.com) is known as a storage provider to the high-performance computing market, it is a new player in the media and entertainment (M&E) space, which it sees as "a great fit," according to David Sallak, vice president of products and solutions. "We researched M&E and determined that our product solves the emerging performance challenges experienced by content creators.

"Panasas ActiveStor allows production professionals to break free from complex traditional shared-access storage workflows by offering a scale-out NAS with high performance that increases with scale. ActiveStor supports the highest data transfer requirements while maintaining the highest availability and a single point of data management across all users," he explains.

One reason Panasas pursued the M&E market is the trend of increased bandwidth requirements and larger data sets. "Everything is bigger," he says. "We're getting feedback from Japanese broadcasters who are aiming for 8K broadcast for the 2020 Olympics. And other customers have told us that while they're currently delivering product in HD, some outlets are considering 4K and HDR delivery later this year. So they need to invest in a shared-access storage platform that will scale to support larger media production formats."

Panasas offers "an ideal way to experience infrastructure that supports HD pipelines and will scale up bandwidth and performance easily without introducing greater complexity," Sallak says. "We've historically done this in high-performance computing markets and now bring these benefits to the M&E industry."

ActiveStor is a capacity-based NAS platform that incorporates hybrid flash/SATA storage nodes to accelerate workflows while simplifying data management. ActiveStor appliances are configurable by customers to meet their needs for performance and budget and offer from 50TB to more than 200TB of capacity per unit.

Last summer, Panasas introduced ActiveStor 20, which features a 65 percent increase in flash and 25 percent increase in hard drive capacity via 10TB helium-based hard drives. Scalability increases from hundreds of terabytes to dozens of petabytes in a single namespace and performance ramps up to 360 Gigabytes per second and 2.6M IOPS.

"Improvements have also been made to our PanFS file system, coupled with our DirectFlow parallel data access protocol to deliver a higher-performance pool of storage under a single global namespace," adds Sallak.

Later this year, Panasas expects to introduce an updated version of ActiveStor focused on improved file system data handling. "As asset quantities increase and the volume of assets becomes greater, it's a metadata challenge to track everything and handle it at the speeds at which artists work," he notes. "We look forward to delivering an improved architecture for this."



Panasas ActiveStor 20



JMR MacMini (top) and rackmount (bottom)

In 2016 Panasas announced DirectFlow for Mac, the first and only high-performance parallel data protocol for the Apple Mac. It is delivered on ActiveStor as part of the integrated PanFS file system and standard protocols. It enables users to ingest, process and deliver video faster and in higher resolutions and unifies all their Macs on a simple, high-speed Ethernet under a single global namespace.

DirectFlow for Mac follows DirectFlow for Linux for the high-performance computing space. "We asked M&E customers, if we made DirectFlow for Mac, would people want it?" Sallak recalls. "The feedback we got was, 'How soon can we get it?' We gave the code in its early stages to customers like production companies Asylum Entertainment and Ugly Brother, which helped shape the product and were a big influence in bringing our idea to market."

At NAB 2017, Panasas plans to demonstrate a production-to-post-to-delivery workflow, featuring ActiveStor with DirectFlow for Mac; Axle media asset management; Adobe Premiere Pro on DirectFlow for Mac for editing; DaVinci Resolve on DirectFlow for Linux for finishing and Elemental Encoder on Direct-Flow for Linux for streaming delivery.

#### JMR ELECTRONICS

Steve Katz, vice president of sales at JMR Electronics (www.jmr.com), cites "the growing popularity and shift to PCIe or memory express drives," as an important new trend. PCIe drives were designed for high performance and affordability in the mass marketplace as demand increases for zero latency and very high bandwidth transfers, especially with ultra high-resolution video production and even with gamers, he says.

JMR has stepped up to the plate with SiloStor NVMe SSD, a full-length, half-height PCIe 3.0 x8



JMR's Katz

drive that adds up to 8TB of high-availability storage to any server, computer or workstation. It occupies a x16 PCIe slot and may be connected via Thunderbolt PCIe expansion to computers with that capability.

Launched just prior to NAB 2017, SiloStor "takes advantage of the ultimate bandwidth of the Gen 3 PCI express bus," Katz reports. "We partnered with Samsung, which is among the leaders on the technology curve on PCIe drives, although other drives will function too. We're using very fast and highly reliable Samsung 960 PRO M.2 drives."

SiloStor is available in single-drive, dual-drive and top-of-the-line, four-drive versions. Price is commensurate with storage capacity.

Katz notes that JMR was forward-thinking in developing SiloStar a year ago, but now the PCIe market has "matured a bit" and customers have begun requesting PCIe drives. "Instead of a rack cabinet full of drives to achieve multi Gigabyte per second data transfers, they say it would be nice to have a few PCI cards and do everything inside the computers," says Katz. "Now they really can."

Another trend is "smaller, lighter, less expensive" storage devices. JMR has begun shipping its MacMini Lightning workstations, which were shown at the Alpha level last year at NAB. Now updated and Thunderbolt certified, the workstations are "very media and entertainment oriented," Katz says. "They are very quiet and suitable for use on set as well in editing suites or machine room operations." FotoKem Burbank is among MacMini Lightning's first customers.

JMR's LTNG-XD-8-MM2U is a 2U rack-mount workstation/server that allows the user to install a MacMini inside the unit using a provided tray. All connections are remoted internally for Thunderbolt breakout to PCIe slots and front-panel and/or rear-panel connections for all the Mac I/O ports. It includes a 75-in-1 media card reader at the front panel for camera ingest. With its built-in hardware RAID controller, it provides eight 2.5-inch SSD hot-swappable drives at the front panel with up to 32TB native capacity.

LTNG-XQ-8-MMDT is a desktop unit with similar functionality; it accommodates eight 3.5-inch hard disk drives or can be used with SSDs.

Katz notes that while SSDs have increased in capacity and reduced their cost-per-terabyte over the last year, the advance of NVMe technology now offers higher performance for less cost. "I think NVMe will take over the space for most high-end applications," he forecasts. "It's economical in cost-per-Gigabyte, takes up less space, weighs less, is less complicated since you don't need a bridge controller and it's much higher performance. Users get more bang for the buck."

#### SYMPLY

Although Symply (www. gosymply.com) launched little more than a year ago, the high-performance storage provider is not new to either storage or the M&E space. Alex Grossman, its CEO, had responsibility for all server and storage products for seven years at Apple and then started Active Storage.



Symply's Alex Grossman

"We've been following the way people work with storage in M&E and felt we could take the newer hardware and software technologies and add a new dimension to storage," says Grossman. "We're also known for making storage easier."



#### SymplySHARE

Symply has partnered with several companies to build on a base of solid commodities and add its "special sauce" to create Symply-branded products, Grossman explains. Partners include Promise Technology for RAID technology and Quantum for StorNext 5 file sharing.

This approach has enabled Symply to "build extremely unique products for high resolution, high frame rate and HDR in a way that's less expensive than anyone else. We've eliminated the war between



NAS, SAN and direct attached storage, by making it all work together seamlessly," he reports.

Symply has also shown itself to be one of the early players in workflow optimization, which is key to "smaller workgroups that demand the same level of performance as big workgroups," says Grossman. "We build self-optimizing systems based on the workgroup need, so the storage is smarter."

Symply's NAB 2017 will be packed with products and technology demos. SymplySHARE will be shown in a live demo. Billed as the first 100 percent Xsan-compatible, desktop-shared workgroup solution, it provides super-fast shared storage for small workgroup settings that Grossman calls "the millennial workspace." Users can connect up to eight Thunderbolt workstations and 20 10GbE IP users to SymplySHARE, configure their environment and instantly share up to 128TB of hard-disk storage or a combination of hard disk and SSDs. SymplySHARE is powered by StorNext 5, and uses SymplySTOR RAID units to provide transportable and flexible storage options. It's perfect for 4K and higher-definition editing and finishing.

SymplyPRO, which began shipping in February, will also be showcased. An all-in-one collaborative storage workspace, it "combines SAN and NAS with a Linux RAID core and StorNext 5 in a 4U size with up to 24 drives," says Grossman. "With SymplyPRO, you can build out a workspace that previously took a 10U space, was more expensive and drew more power to run." The base system comes with 192TB of storage (expandable to 768TB), quad 16Gb fibre channel and dual 10GbE IP ports per controller supporting MacOS, Windows and Linux clients. It's ideal for 4K, 8K, high frame rates and HDR workflows.

Symply's NAB booth will also feature Symply-RAID, a high-performance, low-latency RAID storage system for large-scale media workflows; Symply-STOR, a high-performance Thunderbolt 3-enabled storage solution for individual content creators; SymplyGO, a new way to deploy and manage storage workspace in media workflows that's at the heart of every Symply product and the company's SANLink3 next-generation network connectivity for Thunderbolt 3.

#### ΑΤΤΟ

Industry trends concerning more and bigger data are pointing the way to product development at ATTO (www.atto.com). "We've watched 4K blossom and 8K gain traction," says Carllene Mowry, ATTO product evangelist for M&E. "Along with 8K, HDR comes into play impacting file size and requirements. We're also looking at VR, not only for consumers but what it means for content developers." While some of these high-resolution formats may not yet have industry-standard specs, it's already time for tech companies to chart them on their road maps.



ATTO ThunderLink

"We have invested our development efforts in enhancements to products so large data transfers are not only fast but optimized for their environment: Are they streaming to SAN? To direct attached storage? To NAS? ATTO looks at the data set requirements and the efficiencies we can bring to the user based on their deliverables," says Mowry.

ATTO is the M&E leader for Fibre Channel, which the company views as key to collaborative workflows. "We are well-entrenched in Gen 6 Fibre Channel with 32-gigabit per second performance that offers the capabilities needed to take content producers from 4K to 8K," she reports.

ATTO's NAB booth will include its Celerity line of Fibre Channel Host Bus Adapters (HBAs), which enables users to collaborate for peak performance even with the most massive file sizes. Celerity 32Gb, 16Gb and 8Gb HBAs cover the full spectrum from enterprise workgroup and server to workstation environments. They work seamlessly with all Fibre Channel 4, 8 and 16Gb devices. Upgrading to 16Gb Celerity Fibre Channel, for example, can double performance of 8Gb SAN networks while preserving existing storage infrastructure investment. "ATTO Celerity is a great fit for collaborative workflows when used with private cloud," says Mowry.

ATTO will also display its Thunderbolt 3 technology at NAB. Its strong range of ThunderLink products enables storage and network connectivity to SAS, SATA, Fibre Channel or Ethernet devices for Thunderbolt-enabled workbooks and workstations. "They offer high-performance mobile workstation connectivity with Thunderbolt 3 interfaces," Mowry explains. "The devices connect Thunderbolt 3 to 40or 10-gigabit Ethernet or 32-gigabit Fibre Channel."

NAB showgoers will also see ATTO's FastFrame 40Gb Ethernet Network Interface Cards, which provide connectivity for workstations or servers to networked environments.

ATTO is expected to bring new offerings to NAB, too, where the company will be listening hard to customers and prospective. "The feedback we get at NAB gives us insight and guidance for our road map and helps determine where we'll head with our product plans."

#### FACILIS

Last year, an emerging storage industry trend appeared to be finding the optimal way to approach SSD technology for media and entertainment. But James McKenna, vice president of marketing and pre-sales support at Facilis (www.facilis.com), observes that, "SSD is still the performance leader, but hasn't followed Moore's Law of the spinning disk. Enterprise SSD prices are still high and capacity hasn't taken a big jump forward." On the other hand, "hard drives keep getting better generation after generation, so rumors of their death have been greatly exaggerated. Customers can now gain increased performance with hard drives without reinvesting in new SSD technology."

A prime example of this is the Facilis Hub Server, which will make its debut at NAB. It uses a new architecture to optimize the hard drives and create bandwidth from standard Facilis Terra-Block storage systems, "It aggregates the speed of multiple drive groups and offloads some of the processing duties

to create greater performance than the

Block owners who add the Hub can expect to double or triple their available performance, he reports.

"We identified limitations in the traditional architecture and knew it couldn't be overcome without a change in hardware, but we didn't want to obsolete existing TerraBlock customers. We had to guite literally think outside the box and add a new component to the configuration, and that is the Hub server," says McKenna. "The resulting solution is affordable and powerful for existing users. Cost per video stream drops substantially when adding the Hub server alone or in addition to a capacity upgrade."

A trend he sees continuing is IT convergence.

Facilis FastTracker Facilis Web Console Facilis Hub Server Stack servers can normally generate," McKenna Facilis TerraBlock explains. "The resulting speeds compare & TX16 Expansion well against the SSD-based systems, albe-Facilis Hybrid24 & SSD8 Facilis product family it within a larger form factor." Some Terra-

## **AVID RENTALS** SHARED STORAGE AND EDITING SYSTEMS

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Call Toll Free 888-858-4180 www.myavidrental.com "It's happening even in small post houses," he says, prompting post production professionals "to look for ways to integrate SANs with a larger network environment." Facilis products "make that very easy," McKenna says, with features developed "around industry-standard software and client interfaces that are easier for IT to get their heads around."

Additionally, Facilis's new Web Console software interface, available across its TerraBlock and Hub product lines, offers browser-based Web management. "It's a modernized interface that enables new features for administration and management of volumes and users, and monitoring of system performance that you can't get from most of our competition in the premium shared storage market," says McKenna. "It also removes some limitations — the number of mounted volumes and the number of connected users are now unlimited."

Another trend he sees among storage customers is realizing they need "some kind of asset management system" to aid them in working with files, moving files and tracking files, McKenna reports. "People held off getting asset management systems because they felt it would change the way they work. Our FastTracker is a simple but comprehensive application for cataloging, searching and accessing media. It's included with every TerraBlock system and it doesn't require users to revamp their entire workflow." FastTracker first shipped in early 2016.

Looking ahead, McKenna says customers doing VR and AR production with 360-degree immersive video need to handle very high bit rate, loss-less compression. "We want to be ahead of the curve when it comes to that," McKenna says. "We previewed 8K virtual reality playback at IBC last year."

#### G-TECHNOLOGY

Much of G-Technology's (www.g-technology.com) storage portfolio uses hard-drive and SSD technology to deliver high-capacity, high-performance solutions to the creative community. That mix of storage media still offers the best approach for customers who are "handling 4K and 6K workflows, high frame rates and using HDR in production," notes Greg Crosby, worldwide senior product line manager. G-Technology's Evolution Series Ecosystem features various drive modules in different configurations, which operate as standalone drives or plug into several docking solutions.

"What's been exciting for us is partnering with companies that are taking high resolutions and high frame rates to the next level," Crosby says. G-Technology teamed with Red to build the ev Series Reader Red MINI- MAG edition, showcased at NAB last year. The reader optimizes workflow for Red shooters by transferring content quickly from Red MINI-MAG media onto an ev Series-compatible drive.

A new partnership with Atomos, whose solutions merge video recording, monitoring and playback in a single touchscreen device, now streamlines the Atomos workflow, too. G-Technology's Atomos Master Caddy inserts directly into any Atomos-compatible recorder. Then it slides into the ev Series Reader Atomos Master Caddy Edition to transfer footage and quickly turn around formatted media.

Crosby promises that G-Technology's booth at NAB 2017 will demonstrate how the company applies the technology in its portfolio and best implements new interface technologies, such as Thunderbolt 3 and USB Type-C, for customers. "We're excited about those new interfaces and the ability to provide solutions with a big enough pipe to move data quickly and play back content in larger creative ecosystems using high-quality displays," he says.

G-Technology has a reputation for listening to its customers "from consumers to the big studios," Crosby notes. The company reaches out regularly to its G-Team of brand ambassadors, which includes noted director/DP Vincent Laforet. "We ask what they're up to, how they're pushing the limits, what challenges they're facing," Crosby explains. "Our brand continues to deliver solutions customers are looking for. Customers embrace the value we bring to professional workflows."

At NAB last year, G-Technology showed G|RACK, a rack-mounted video editing storage product focused on collaborative post production. The G|RACK 12 provides a 120TB high-performance NAS solution that streamlines 4K and above workflows.

"It's a fast networking device for collaboration," says Crosby. "It's easily scalable as needs change and users require the ability to grow their storage capacity." Up to 500TB of usable storage may be achieved by adding four G|RACK EXP 120TB expansion chassis units to the server.



## POST IN THE CLOUDS

#### THE EVOLUTION OF POST PRODUCTION

Post production refers to the various processes for converting raw video content (e.g. from cameras or computers) into a form that can be used for its intended purpose, such as broadcast, theatrical display or Internet streaming. A very important part of the post process is editing. Modern editing works with digital content. This editing is referred to as nonlinear editing (NLE), since digital technologies allow access to and changing of content anywhere in a video stream.

Figure 1 is a schematic of a nonlinear editing station showing local storage and DRAM for basic caching



#### Figure 1

and storage of edited content, as well as optional connections to shared online (or realtime) storage via a SAN or NAS using some sort of network connection (GbE or HBA), as well as cloud-based storage in a remote data center.

NLE is generally done using computers. With the increasing capability to generate content in computers, video editing has come to depend on computers to connect content together in an artistic or useful way as well as generate original content. Traditionally, NLE has been done using dedicated workstations as well as desktop or laptop computers, but there are increasing advantages for collaborative workflows that are driving post production to the cloud. Also, there are important operations on content, such as rendering and transcoding, that are often done using cloud services.

There are many sources for cloud-based, digital storage and computation resources from specialized vendors targeting the media and entertainment market, as well as targeted services from more general vendors such as Amazon Web Services and Google Media Services. Considering the number of cloud stor-



BY **TOM COUGHLIN** COUGHLIN ASSOCIATES WWW.TOMCOUGHLIN.COM

age vendors at recent professional media conferences, such as the NAB and IBC shows, as well as more regional shows such as the Creative Storage Conference, there is a great deal of interest in expanding cloud storage resources for media and entertainment applications.

Although much post work is kept within a facility, there is an increasing trend, particularly for movie production and Internet content companies, to create collaborative workflows where the post activities may be done anywhere in the world. While the latency of remote access through the Internet may limit the use of cloud storage for direct creative editing (although there are companies offering such services).

Cloud storage can be used for 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, performance and management as the asset library grows.

In addition to consolidating 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 a video production project. Thus leasing time on a cloud service makes a lot more sense to many production facilities than, for instance, buying and maintaining a state-of-the-art rendering facility. In general, cloud-based services and storage will play a bigger role in future workflows.

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 and independent movie projects that cannot or do not want to invest in the complexity of local archive storage infrastructure. It may also be interesting for larger facilities wanting to add disaster recovery layers to their digital archives.

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 used in digital workflows and content distribution include Amazon Web Services, Aspera (now part of IBM), Avid, Cleversafe (now owned by IBM), Google Media Services, DataDirect Networks, Dell/EMC, Fujifilm, Imagine Communications, Oracle, NetApp, Quantum, SAN Solutions, Scality, Signiant and Zadara (to name only a few).

Amazon and Google are both vying to provide cloud storage for the media and entertainment industry. Last year at NAB, Avere Systems teamed with Google to deliver data processing and storage in the cloud. In addition to various tiers of cloud-based storage, Google also offers its Zync render platform for content creators. Amazon Web Services has its own rendering service. Amazon has been used by media and entertainment professionals for several years for digital storage and other services.

Many companies use hyperscale data center storage as part of their offerings or private or hybrid cloud-based architectures, including the big storage vendors, as well as companies such as Zadera, Edit-Share, Facilis and Xendata. EditShare announced that its AirFlow editing utilizes on-premise storage already used for high-bandwidth workflows to provide secure access to media from anywhere in the world with a basic Internet connection.

At the 2016 NAB Show, EMC, Pixspan, Aspera and Nvidia demonstrated bringing uncompressed 4K workflows to IP-based IT infrastructures, advancing digital media workflows with full-resolution content over standard 10GbE networks.

Because Internet accessible stored content (private or public cloud storage) has higher latency than either local (direct attached) or local network storage, we project minor contribution from cloud storage to true post production operational storage (although not in the role of supporting storage to enable collaborative workflows) for the next few years. Note that local (in facility) storage is generally either block or file based, although object storage is becoming more popular, particularly for long-term data retention.

## THE GROWTH OF CLOUD STORAGE IN MEDIA AND ENTERTAINMENT

Figure 2 plots the projected annual demand in total storage capacity for post, including NLE, breaking out direct attached, network attached post storage capacity and cloud storage capacity to 2021. The incredible growth in storage is driven by work on 4K and 8K higher-dynamic range content, as well as expected growth in 360-degree video for augmented reality and virtual reality experiences. Also, with decreasing costs for cameras, content creators are using more cameras at once so they can pick and choose what content they want to use. All of this content requires storage to capture and edit and then to store the resulting content for delivery and future use.



#### Figure 2

The majority of the cloud storage used in NLE is used to support collaborative workflows as well as storage for specialized operations performed in the cloud, such as rendering, transcoding, etc. However, once content is in the cloud, it is easier to continue to operate in the cloud. This is often a great way to lock in customers for multiple services, but there are companies who are looking to provide cloud storage that is tied to but independent of the large Internet services providers and may use equipment in data centers owned by the customer.

With the growth of Internet-based content distribution, much finished content eventually ends up in the cloud where it can be transcoded and sent out over Content Delivery Networks (CDNs) or other distribution technologies to customers.

Storing and delivering content across the Internet is one of the biggest uses of cloud-based storage. Companies such as Encoding.com and Content-Bridge offer transcoding services for the 300 or more distribution formats now in use. Companies such as Aspera, Signiant and BitSpeed provide services to accelerate Internet content delivery.

Other companies, such as Pixspan, offer greater than 50 percent loss-less compression technologies to reduce the total bandwidth requirement to transport content. Some companies, such as Harris, use the RDMA technology originally developed for Infiniband for high-speed Internet transport. Companies like Imagine Communication have provided global programming playout, delivery and network operations with an IP cloud architecture

One of the biggest applications for cloud storage is to provide a digital library of content as well as an active archive. Because of the variable latency requirements in cloud applications, every type of digital storage technology can be used, from flash memory, to hard disk drives to magnetic tape and even optical discs. The choice for the storage media depends on trade-offs between performance and cost. Companies such as Fujifilm offer services like magnetic, tape-based cloud storage in their Dternity offerings.

Although larger studios and other content owners usually keep their own content archives, there are efforts underway to enable very long-term data





retention in cloud storage where the content can be accessed through the Internet. Efforts by the Active Archive Alliance (www.activearchive.com), SNIA (www. snia-dmf.org/100year) and organizations directly associated with the media and entertainment industry, such as The Academy of Motion Pictures Arts and Sciences (www.oscars.org/science-technology/council/ projects/digitaldilemma) and SMPTE (www.smpte.org) are working on methods and standards for long-term archiving of digital media assets.

The higher latency of Internet access can be hidden by using local cloud storage gateways that offer a NAS-like front end access to the cloud storage for uploading and downloading content as needed or with combinations of local and cloud networked storage. Increasing access to fast WAN and MAN networks has also improved online content access. Such cloud storage gateways make implementation of cloud storage as a secondary and tertiary data silo possible and efficient.

Ingest and data delivery data transfers of terabytes per day are possible on modern Internet networks (using e.g. Aspera's FASP technology or Signiant Media Shuttle or some interesting solutions using RDMA for direct data transfer across the Internet).

Front Porch Digital (now part of Oracle) built its DIVA archive using the AXF video file format that enables cloud archive applications. The Archive Xchange Format (AXF) is a SMPTE specification, ST 2034. AXF has capabilities that make it particularly attractive for archiving. Unlike LFTS, AXF is a file collection "wrapper" that can encapsulate any number of files of any type and size. AXF provides universal transport and interoperability for archives like MXF provides for media.

Quantum showcased its Q-Cloud Vault long-term cloud storage service at the 2016 NAB Show. This is fully integrated within workflows powered by StorNext 5.3, Q-Cloud Vault to provide low-cost, Quantum-managed "cold storage" in the public cloud.

Oracle announced in 2016 an archive cloud with costs of about \$0.001/GB/month or about \$0.012/

GB/year, based on magnetic tape storage. This equates to storing 1 petabyte (PB) of content for just \$12,000 per year.

XenData, a company specializing in digital archiving and data protection equipment and services, has added support for Amazon Web Services (AWS) Storage across its entire archive appliance and server product range.

Professional media and entertainment content was traditionally archived on film or analog videotapes. Today, the options available for archive media to store digital content depend on the preferences and existing infrastructure of digital archive facilities. Figure 3 gives the percentage distribution of archive media used by the survey participants. In our survey, 38.1 percent said they would use a private or public cloud for archiving in 2016, although only 2 percent currently stored their archives in a private or public cloud.<sup>1</sup>

Note that the 2017 professional media and entertainment survey is underway through May 15, 2017. Media and entertainment professions can participate using this link: www.surveymonkey.com/r/FPRW6Y5.

There are many permutations of cloud storage that include private and public cloud resources and there are several company offerings that combine local, near-line storage with some type of cloud storage. In general, cloud storage is a form of near-line storage, although there are high-latency offerings, such as Amazon's Glacier, that provide high-latency storage that is more like off-line storage. Thus, cloud storage can be effectively offline or near-line in terms of its performance for a remote user.

All of the media applications for storage in the cloud will be a significant driver in overall cloud storage growth. We expect that cloud storage for all media and entertainment applications will increase almost 27-fold between 2015 and 2021. Cloud storage will play an increasingly important role in all aspects of professional media and entertainment.

#### 2017 CREATIVE STORAGE CONFERENCE

You can learn more about media storage in the cloud, as well as the growth in VR content in professional video, at the 2017 Creative Storage Conference (www.creativestorage.org), on May 24, 2017 in Culver City, CA. We will also discuss how this will drive new digital storage demand and technologies to support the high-data rates needed for captured content and cloud-based VR services. This is the 11<sup>th</sup> year of the conference and we look forward to having you join us.

Thomas M. Coughlin is president of Coughlin Associates and is a widely respected storage analyst and consultant. He has over 30 years in the data storage industry.

## STORAGE NEWS

## CINEPOSTPRODUCTION SPEEDS DCP DELIVERY WITH ASPERA

Founded in 1911, CinePostproduction (www.cinepostproduction.com) is a leading film and television post production facility in Munich, Germany. Its services include duplication of DCP copies, DCP versioning and mastering, localization of trailers and KDM services. To simplify the handling of trailers and DCPs, CinePostproduction developed the SHARC DCP portal, which is used by most cinemas in Germany, Austria and Switzerland to download DCP trailers, as well as for DCP key creation and management.

CinePostproduction previously relied on physical shipment to distribute cinema content to its partners. Satellite transfers were too inflexible and large-scale distribution to hundreds of cinemas doesn't work properly in Europe, resulting in satellite operators withdrawing from the market. Other traditional digital transfer methods were unreliable, inefficient or costly.

But with the transition to digital cinema, film producers and distributors needed a way to deliver DCP masters — which typically range from 100GB to 400GB — electronically. And data volumes are even greater for CinePostproduction's TV and cinema post production operations, with data sets between 150GB and 1.5TB per feature film sometimes needing to be transferred globally.

To overcome these challenges, CinePostproduction integrated Aspera On Demand (AOD) into its SHARC system to speed the ingest of DCPs from studios and delivery of DCPs directly to cinemas, ensuring feature films are delivered on time and with full security and proving control over bandwidth allocation needed to distribute DCPs change over time depending on the number of movies and the number of theaters involved in the release. Running AOD in the cloud allows CinePostproduction to scale storage and transfer capacity as needed to meet variable customer demands without impacting CinePostproduction's on-premises infrastructure used for post and archiving. With Aspera, CinePostproduction can use SHARC for large-scale distribution to hundreds of cinemas.

The distribution platform is extremely cost effective because theaters can use their existing infrastructure to achieve maximum speed delivery — they simply install the CinePostproduction client software, which contains an embedded Aspera Client, and receive DCPs directly from SHARC to the theater over their existing broadband connection.

By fully integrating Aspera into its existing infrastructure, CinePostproduction is able to complement the innovative SHARC portal with powerful, high-performance transfers for fast ingest and distribution of large media files. Giving cinemas the option to receive video files over the Internet via SHARC, rather than limiting the service to traditional hard drive delivery methods, has established a more robust, secure and reliable method for on-time delivery directly to cinemas. Whereas physical shipment of hard copies could take up to a week, today content is delivered within hours.

"Most of our studio and production customers were already using Aspera to deliver content to our post production facilities," says Thomas Ramin, CTO of CinePostproduction. "Embedding Aspera on Demand running in the cloud directly into our SHARC digital distribution platform was an obvious choice and allowed us to extend the benefits of high-speed digital delivery to over 400 movie theaters using SHARC."

films are delivered on time and with full secu precise control over bandwidth allocation. Fully integrated with AOD running in the cloud, SHARC can now transfer encrypted, high-resolution (2K or 4K) DCPs between CinePostproduction's Content Delivery Network servers at its data center and participating cinemas.

SHARC replaces traditional slow, unreliable and expensive delivery methods with a state-of-the-art hybrid cloud distribution platform comprising a secure online Web portal for ingest and Aspera FASP highspeed transfer running in the cloud for fast and secure delivery directly to cinemas.

The compute and storage resources



## NETAPP REVEALS NAB PLANS

SUNNYVALE, CA — NetApp (www.netapp.com) will show its E-Series storage array at the NAB Show in Las Vegas next month. Designed for post houses and broadcast facilities, the E-Series is supported by Quantum, Pixit Media, Scale Logic and EditShare file systems.

The NetApp E-Series production storage platform offers 99.999 percent reliability, eliminating concerns about dropped frames in 4K workflows. Operations can choose between RAID resiliency schemes, including Dynamic Disk Pools that dramatically reduce disk rebuild time, provide more consistent performance, and eliminate the need for hot or cold spares. Use of flash technology in hybrid arrays optimizes support for ancillary transcoding and rendering workflows.

The E-Series storage array will be demonstrated in the ATTO booth and at the Scale Logic booth at the NAB Show.

NetApp will also show its ONTAP 9 operating system, which runs on the recently released AFF and hybrid FAS systems. The ONTAP9 provides mature data management tools that improve efficiencies for virtualized application storage and resiliency for content storage. It also offers better application performance than other scale-out NAS offerings in most broadcast media workloads.



### AVID'S NEXIS|E5

At next month's NAB Show in Las Vegas, Avid (www.avid.com) will showcase NEXIS|E5, the company's enterprise-class, hyper-density storage engine, which offers realtime editorial collaboration and high levels of scalability, performance and client connections. NEXIS|E5 provides 40GbE connectivity and 80- to 480TBs of storage capacity per engine, with the ability to scale up to 1.4PBs of capacity and 9.6GBps of bandwidth.

## INTERSECT360 SURVEY RANKS DDN NUMBER ONE AS HPC STORAGE MARKET LEADER & TOP SUPPLIER

SANTA CLARA, CA — DataDirect Networks (www.ddn. com) was again ranked as the top storage provider among HPC sites surveyed by Intersect360. For the third consecutive year, DDN posted the largest share of installed systems at HPC sites and held its solid lead over other storage providers at HPC sites surveyed in Intersect360 Research's "Top of All Things in HPC" survey. This report caps off a year of strong recognition of DDN as the performance storage leader that included awards ranging from best HPC storage product/technology company, best big data innovator, best storage company and best enterprise NAS to leadership recognition in IDC's MarketScape report.

DDN results showed that it had the largest share of installed systems at HPC sites (14.8 percent), gaining almost a full percentage point over the previous year. DDN's closest competitors follow at 12.7 and 11.0 percent, and all other suppliers had less than 10 percent share of reported storage systems. According to DDN, it feels that its continued strong showing is a testament to the success of the company's focus on solving the toughest data access and management challenges to deliver consistent, cost-effective performance at scale.

"High-performance sites are incredibly challenging IT environments with massive data requirements across very diverse application and user types," says Laura Shepard, senior director of product marketing, DDN. "Because we are a leader in this space, we have the expertise to provide the optimal solutions for traditional and commercial high-performance customers to ensure they are maximizing their compute investment with the right storage infrastructure."

Intersect360 Research forecasts storage to be the fastest growing hardware sector in HPC, and according to a recent DDN survey, end users in the world's most data-intense environments, like those in many general IT environments, are increasing their use of cloud. However, unlike general IT environments, the HPC sector is overwhelmingly opting for private and hybrid clouds instead of the public cloud. More than 90 percent of HPC sites surveyed are modernizing their data centers with flash, with the largest cited use cases being flash acceleration of parallel file system metadata, specific application data and specific end-user data.

Survey responses show that I/O performance and rapid data growth remain the biggest issues for HPC organizations — a circumstance that favors continuing strong demand for DDN technologies that are leading the market in solving these challenges.

## ARCHION'S EDITSTOR SEES SUCCESS IN CANADA

LOS ANGELES — Archion Technologies, a provider of high performance shared storage solutions for media workflows, reports the rapid adoption of its EditStor in Western Canada, which includes Fusion Cine, a media and entertainment technology vendor, and Great Pacific Media, a producer of factual television content. Both companies have invested regularly in EditStor for large scale post production and broadcast requirements involving high profile TV programming.

Fusion Cine's clients include Netflix, AMC, CTV, CBC, Showcase, Amazon and DirecTV. Recent projects have included the Netflix series *Dirk Gently's Holistic Detective Agency* and *Travelers*, to name a few.

Mark Todorovic, the post division manager for Fusion Cine, explains that his company not only sells post equipment like Archion's EditStor, but also rents both post and camera equipment to the TV & film industry in Vancouver. On the post side, Fusion Cine rents everything from a single Avid Media Composer on up to a full, turn-key editorial department, and can drop in a whole set up, including computers, servers, all editorial tech, storage, cabling, desks along with 24/7 support.

"We have been selling and using Archion products

for about the last seven years now," says Todorovic. "Today, we regularly offer EditStor units to our diverse client base within the media and entertainment industry who use a variety of creative tools, ranging from Avid Media Composer to Adobe CC to DaVinci Resolve, Red, and more. Between our rentals and our sales, we've moved nearly a dozen EditStors units to our customers during the recent past."

Among Fusion Cine's clients is Vancouver-based Great Pacific Media (www.greatpacifictv.com), a producer of factual television content in Western Canada. GPM's post department employs between 60 and 65 people, and is currently working on five HD TV shows. Those projects include GPM's flagship series *Highway Thru Hell*, currently in its sixth season; the second season of a sister show out of Ontario called *Heavy Rescue 401*; two home renovation shows - *Save My Reno* (shot in Toronto) and *Worst to First* (shot in Vancouver); and a fifth show entitled *Queen of the Oil Patch*, which will soon begin production in Edmonton.

Jason Mullen, operations manager with Great Pacific Media, says 47 team members are attached to the EditStor. These include 15 Avid editors, writers, producers, show runners, and assistant editors. GPM also does all of its own online and coloring on-site. At present, GPM has four TV shows on one EditStor embellished with three chassis, giving the system 75TBs of storage.

## QUMULO ADVANCES SCALE-OUT STORAGE

SEATTLE — Scale out storage provider Qumulo (www. qumulo.com) has announced the next release of Qumulo Core, delivering machine intelligent storage quotas. Qumulo's machine intelligent quotas provide storage administrators with the flexibility to allocate storage resources without the compromises associated with legacy scale-out storage systems. This release of Qumulo Core also brings to market the Qumulo QC360, a new, high-density, storage platform that provides industry leading density, performance and cost.

Qumulo Core is a new generation of scale-out storage engineered to store and manage unstructured and file-based data at Web-scale. "Unstructured, file-based data is the crown jewel of the modern day enterprise and petabyte scale data storage is the new normal," says Bill Richter, CEO of Qumulo. "Legacy scale-out NAS systems were not built to store and manage data at this scale. Qumulo Core, with machine intelligence built into the file system, ushers in a new platform to store, access and manage file-based data at Web-scale in on-premises data centers and the public cloud." Key features of Qumulo's machine intelligent quotas include native quotas, which are storage quotas built into the file system. They are always up-to-date and insync with the file system. The benefits of this approach include a reduction in storage administration time and freedom to move preexisting data and directories between quota domains as needed. Intelligent quotas means every quota is a policy that executes a set of realtime queries. Unlike traditional systems that require tree-walking of the entire directory structure, intelligent quotas can be immediately enforced.

With the QC360, customers can achieve maximum capacity and cooling efficiency of their data centers, while also achieving tier-one storage performance. The QC360 delivers three petabytes of usable storage and 10GB/s per rack of throughput at less than \$.01 per gigabyte per month.



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