Realise your potential with Dell EMC solutions for Media & Entertainment
With heavy 4K video data streams, editing causes a considerable load on the network, and Dell EMC solution integration keeps workflows smooth. Dell EMC can cope with VR content easily, which Dell EMC seamless integration a huge benefit.

Media and entertainment companies need to know that the software they use will work and be supported on their chosen hardware platforms. Dell EMC hardware is certified with all the main content creation software vendors.

Dell EMC ability to provide tailored hardware solutions across the full range of media and entertainment content creation and distribution workload provides real value. But most important of all, Dell EMC will work with clients to create - and test - the perfect solution for a given workload ecosystem.
The media and entertainment industry was valued at $1.81 trillion in 2016, and is expected to reach $2.14 trillion by 2020. Activities within this industry have grown over the last couple of years, and now range from creating content for movies, TV and games, to delivering that content. This is increasingly performed via on-demand data networks rather than traditional over-the-air broadcasting, watched over high resolution displays that enhance the overall viewing experience of the user, and even the latter is being delivered from the same storage repositories. Media production is also now prevalent in areas not traditionally associated with this activity, such as training, museums, and education.

Thanks to this ever-expanding activity, there are many areas where content is being produced and distributed. There’s also a lot of competition for pieces of the pie, so companies working in the sector need to keep ahead of the technological curve, and ensure their workflow is as efficient as possible. Maintaining an advantage in this environment requires a supportive provider and streamlined choice of hardware platforms. The more fluidly those platforms work together, without having to be reconfigured after deployment, the more economical the production workflow will be.

However, there are also lots of different workflows in the media and entertainment industry, and these put different emphases on the elements of the hardware chain. Some content creation activities, such as 3D animation, VR, compositing, grading or non-linear editing, will place the compute focus on the workstations. Other types of activity, such as 3D rendering or video format transcoding, will require greater processing power in the datacentre. All of these tasks will not only require fast networking and fast shared storage, but also professional grade monitors with high resolution, precise colour grading and industry relevant colour coverage that reproduce data in high fidelity. Digital video production, whether for TV or film, will put particular emphasis on the storage part of the equation as well as being able to view and edit data natively with 4k, especially
now that 4K is becoming the norm, and 8K and HDR looming on the horizon.

Dell, with the merger of EMC, can provide the best-in-breed hardware solutions for this process – to create, manage and deliver, and use its unique position to offer technology to service the entire pipeline, including workstations, colour critical monitors to view and edit content, rendering or encoding servers, networking, and storage. The Dell Precision workstation portfolio can fulfil any workstation requirement, from mobile to tower to All-in-Ones to rack-mounted solutions. Dell UltraSharp monitors with PremierColor technology offers vivid, accurate, professional colour standards for colour-critical projects. Dell PowerEdge servers provide a comprehensive range of servers for computer-intensive tasks, Dell EMC Isilon offers a range of top-performance and high-capacity storage, whilst Dell EMC networking stitches it all together with high-speed switching.

All of these components are state-of-the-art in their own right, but putting them together provides even greater synergy. There is huge benefit to deploying hardware that all comes from one manufacturer. For starters, the vendor will be in a much better position to design a solution where all the bits of the system function together in an optimal way. During day-to-day activities, support requirements won’t lead to “ping-pong” between different vendors until the actual cause of a problem is pinpointed. There are performance optimisations available too, with hardware specified to work together and fully tested with a specific workload.

In this paper, we will begin by looking at how hardware integration has benefited business value and maximised the productivity of media and entertainment company, Animal Logic in Sydney, Australia. We will then look at Dell EMC media and entertainment product range before turning to some example workflows from the industry, and analysing exactly how their hardware offerings can benefit each one. We will analyse grading workflows with Da Vinci Resolve as an example, 3D rendering, non-linear editing, and content delivery with multi-format transcoding. By the end of this white paper, we will have shown exactly how a complete Dell EMC solution including storage, networking, servers and workstations with monitors can provide immense workflow benefits for every sector of the media and entertainment industry, which will lead to greater efficiency and profitability.
Animal Logic is an Australian animation and visual effects company with bases at Fox Studios in Sydney, Warner Brothers Studios in California, Vancouver in Canada and London. The company has an A-grade movie track record, including VFX credits for Happy Feet, The Lego Movie, The Lego Batman Movie, The Matrix, 300, Legend of the Guardians, and The Great Gatsby, amongst others. Animal Logic has been working with Dell and EMC hardware for nearly a decade. “We have been using EMC Isilon storage since 2008,” explains Alex Timbs, Animal Logic’s Head of IT. “We have around 8.5PB of storage in Sydney and 0.5PB in our Vancouver studio.”

Animal Logic uses Dell Precision mobile workstations and UltraSharp monitors, its other primary use of Dell EMC hardware is PowerEdge servers. The company employs C6300 enclosures with C6320 dual-socket blades. There are 256 of these dual-socket nodes in the Sydney studio, and 128 in Vancouver. These make up a significant portion of the company’s 3D animation rendering pipeline. Animal Logic also uses Dell EMC networking for its Avid editing suites.

“Dell EMC PowerEdge servers played a critical part in us getting the role on The Lego Batman Movie,” argues Timbs. “All the hardware is from Intel at the end of the day. When it comes to who we partner with, it’s getting the biggest bang for buck.” Density is also fundamentally important, because Animal Logic houses its datacentres in Schneider shipping containers, which constrain the space available. One of

Case Study: Animal Logic

Companies within the media and entertainment industry are already benefiting from the synergies Dell EMC has to offer, with Animal Logic a prime example

Animal Logic’s containers was purchased through Dell EMC, with the hardware inside tailored to the space available. “The Dell EMC management platform is also very useful,” continues Timbs “Deployment is easy and there are relevant tools for the media and entertainment industry.”
However, it is the relationship that Animal Logic has built with Dell EMC that is central to the continuing partnership, and this comes down to account management. “It’s all about how well the vendor manages the account; not just selling stuff to us, but truly understanding the business we’re in,” explains Timbs. “They give us the right products at the right price for the task intended, but treat our success as their own. This is how they go from being a vendor to being a partner in making movies.”

Prior to the acquisition, both Dell and EMC were already well versed in the media and entertainment industry. “There could have been a risk when two pin-up vendors merged that this culture would be diluted,” explains Timbs. “But the combination was well and truly aligned to our success. Dell EMC can now offer end-to-end solutions across hardware, software and services, with a single account team that understands our business, and that can deliver anything and everything we need. There can be a lot of inherent bureaucracy in a large company, but the account management team hides the bureaucracy to make things feel more agile.”

Timbs appreciates the ability to monitor Dell EMC equipment, and is looking forward to this extending across a complete hardware ecosystem. It’s how a vendor helps companies build the solutions that are right for their business that is fundamental to Animal Logic. “The most important thing that any vendor can do is listen,” explains Timbs. “We don’t want to be preached at. When vendors listen, real change can come out of that feedback. For example, we requested our account team stay in place after Dell merged with EMC, and they are.”

Another key part of the vendor-client relationship is the kind of assistance the vendor gives the client. Animal Logic has been given the opportunity to test appropriate hardware configurations prior to rollout, centred around specific industry needs, and sometimes even ahead of official release. For example, the amount of data involved in Animal Logic’s business consistently poses backup and archiving challenges. Dell EMC discussed this with the company and how the Elastic Cloud Storage offering might be able to help. Within a month of the discussions, a new Dell EMC ECS appliance was delivered so that Animal Logic could test out the possibilities.

It’s very important that a vendor helps the client identify the right product for their needs and ensures that this actually does what is required when tried and tested. “This can mean being able to say what doesn’t fit, and may not be the right solution, as well as what does,” argues Timbs. “When we have developed a new hardware solution with Dell EMC, they produced a tested image for it, and gave us resources to support engineers for monitoring render nodes. They have always backed projects with the right level of engineering capability, offering both pre-sales and post-sales expertise. There’s always resources available to get the most value out of our platforms. This includes onsite assistance helping us configure the administration tools, for example tips on updating the BIOS to the most compatible version, and advice on imaging.”

Having a single point of contact for sales and support is particularly key in this process. This means that the understanding that the support teams obtain about a company’s business through day-to-day dealings will be shared with sales teams. “They will know what opportunities exist, how to approach resources, and what the new opportunities are,” explains Timbs. “The single point of contact is a huge value for Dell EMC. I don’t want to have really solid relationships with representatives of lots teams. I just want to go to one person to explain our business. It just makes sense.”

“The Dell EMC product offering that has come out of the merger with EMC means that we have got end-to-end opportunities for business solutions,” Timbs continues. “These are from a company that has a proven track record of understanding a customer’s needs, and is able to derive the right solution to our business challenges and problems, at the right time, at the right price, and with the right backing.”
Dell EMC Solutions Portfolio for the Media and Entertainment Industry

Since merging with EMC, Dell now has the five key components of a complete media and entertainment solution – workstations, displays, servers, storage and the networking that binds them all together. Before we look at specific use-case scenarios, here is a selection of the most likely options in each of the five ranges.

Dell Precision Workstations

Dell has a full range of powerful workstations, from mobile to top-end powerhouses. The Dell Precision Tower 5000 series is the single-socket workhorse, optimal for design work, for example with Autodesk Maya or 3DS. This workstation can still offer up to 18 cores, but with high clock speed options up to 4GHz. Graphics can be anything either NVIDIA Quadro or or AMD Radeon.

Beyond that is the Dell Precision 7000 Series, which also has the option of dual sockets. However, whilst the T7810 supports two graphics cards with a maximum power consumption of 300W altogether, the T7910 has a larger chassis design that can support up to four graphics cards drawing up to 675W, for hugely GPU-intensive tasks like VR. The T7910 also supports liquid cooling, which allows an almost completely quiet workstation experience.

Based on the 7000 Series Tower, the Dell Precision Rack 7910 provides essentially the same specification in a rackmount format. This is aimed at virtual workstations using Citrix XenServer or VMWare ESXi, as well as network-accessed systems using Teradici dedicated PCoIP hardware for workstation centralisation.

At the other end of the scale, for modest workstation tasks, is the Dell Precision 3000 Series. The small form factor system uses lower-end graphics from NVIDIA Quadro or AMD Radeon Pro. While the T3620 is a mini tower built with support for more powerful mid-range graphics. So small form factor option is better for modest media and entertainment applications like desktop publishing, and the Tower 3620 is a viable option where space is at a premium and needs modest.

A new member of the desktop range is the Precision All-In-One, which integrates a quad-core CPU with AMD Radeon Pro WX5100 graphics inside a chassis incorporating a 27in 4K UHD screen that boasts 100 percent Adobe RGB colour. All of these workstations are also designed to work in tandem with the Dell Canvas, a 27” QHD, horizontal “do” surface that encourages interaction through touch, and highly precise pen and totems work surface, a huge graphics tablet with 20-point touch and Wacom certified stylus for graphics design and content creation work.

Dell’s mobile workstation range is similarly extensive. The Precision 3000 & 5000 Series are 15” models with NVIDIA Quadro mobile graphics respectively, and up to 32GB memory. For more intensive content creation tasks on the move, the Precision 7000 Series comes in 15” or 17” variants, with up to 64GB of memory and NVIDIA Quadros from P3000 to P5000 or mobile AMD Radeon Pro graphics. The 17” 7000 Series is notable as the first certified VR-ready mobile workstation from Dell EMC.

All of the Precision platforms benefit from wide independent software vendor (ISV) certification, so that users can be assured that their professional software will run as intended. On top of this, the Dell Precision Optimizer automatically tunes the hardware for a specific application, with significant performance gains, and set-up time savings, possible. Dell EMC can also provide Precision workstations with custom images that include all the software used by a client company, including any necessary agents for storage.

All of the Precision range benefit from wide ISV certification
Dell EMC PowerEdge Servers

The PowerEdge server range has options for every workflow. The R730 is the mainstream dual-socket server in a 2U form factor, with support for up to 24 cores per CPU. The server provides a balance between CPU and GPU power, with the option for GPGPU accelerators such as NVIDIA Tesla M10 and M60 or AMD Stream. This enables high-performance virtual desktops with 3D acceleration, and this configuration is prevalidated for use with VMware and Citrix.

The R730 can be employed in render farms, but the more effective choice here is the PowerEdge FX2. This 2U chassis is available with a variety of modular compute blocks. Eight FC430 modules or four FC630 modules can be used, with the former switch the former having less storage capacity in its FX2 section. Since both are dual-socket, the FC430 enables up to 16 CPUs with up to 24 cores apiece in a 2U package, which is great for rendering. Storage-focused modules are available too.

The M1000e is a 10U blade chassis with support for 16 M630 blades or 32 M430 blades. The M630, with two CPUs, enables 32 processors in one chassis. With the Amulet Hotkey DXM630, NVIDIA GPUs up to the Quadro M5000SE can be added alongside dual CPUs for PCoIP workstation centralisation.

The R730XD is a specialised version of the R730 without support for GPUs but the potential for up to 26 drives. For a server option with an expanded local storage capability, choose R730XD. The C4130 is another specialist PowerEdge, with dual sockets and room for up to four dual-width 300W GPU accelerators, making this an ideal platform for GPGPU applications.

Dell EMC Storage

Whilst Dell EMC has offered storage-oriented servers for a very long time, the acquisition of EMC in September 2016 indicated a new era in Dell EMC hardware offering, since now the company can provide the full range of components for a complete end-to-end solution for the media entertainment industry. Storage products include the popular Isilon Scale-out network-attached storage and the Elastic Cloud Storage (ECS) cloud-scale, object storage platform. The two products combine to form a Media Data Lake—consolidation of assets that streamlines M&E workflows.

The Media Data Lake reduces costs by eliminating separate “silos” of storage. Every file in every project—from ingest to playout to long-term archive—can coexist effectively on the same file system as proxy media, mezzanine formats, and other assets. Plus, Isilon utilizes a native tiering capability that enables media companies to store and access content according to its business value, providing optimal storage, performance and protection—critical capabilities for media and entertainment data.

The Isilon architecture permits push-button scaling, from tens of TB to many tens of PB. And the extreme performance of the Isilon storage cluster accelerates workflows like ingest and editing, rendering images for high-resolution 3D animation, and running colour correction jobs.

For archival needs, Dell EMC ECS object storage platform provides an on-premise or geo-distributed archival tier, allowing users to tier media assets to their own private cloud storage infrastructure. ECS can also be used as a high-density tier of storage to seamlessly extend the capacity of other storage products like Isilon with CloudPools.

Finally, ECS can be an economically viable alternative to tape-based archives. Media stored on tape cannot be monetized without a planned and scheduled retrieval from a robotic tape library. Using ECS, media is instantly available—and, perhaps just as importantly, the costs and complexities of maintaining a robotic tape library (complexity of the servers, FC network infrastructure, CSM applications, CSM database, and additional database licensing) are eliminated.

The SmartPool technology means data will switch between nodes
Dell UltraSharp Monitors

Powered by Dell PremierColor technology, these monitors offer phenomenal, true-to-life colours and are calibrated at the factory to match industry colour standards right out of the box, with the option to customize colour parameters. The broad colour coverage of AdobeRGB, sRGB, Rec. 709, DCI-P3 and Rec. 2020 meets the requirements of professional users involved in colour centric work. These colour spaces are further enhanced with a depth of 1.07 billion colours, letting users see a better colour gradation and precision in more shades, even in dark areas. For exceptional colour reproduction, each monitor comes with a factory colour calibration report and users have the options to fine-tune the colours using the custom colour mode, or make further adjustments by storing the preferred colour parameters onto the internal Look-UpTable (LUT) using Dell UltraSharp Calibration software with an optional colourimeter.

Dell UltraSharp monitors with PremierColor come in different sizes and resolutions to cater to different needs of the evolving M&E industry, starting from the smallest 25 inch in QHD resolution to the largest 32 inch in 8K resolution. By deploying UltraSharp monitors across the workflow, users can be assured of colour consistency and accuracy, from pre-production to final editing.

Dell EMC Networking

Knotting the above three types of hardware together are Dell EMC switches, with the S4000 series being the primary option. This combines 48 ports running at 10Gbit with six ports running at 40Gbit. The stacking backplane uses the 40Gbit ports, and the switches are offered in a 1U form factor. They are non-blocking and provide full line rate, with extremely low latency and useful extra features like reversible airflow, so they can fit into any cooling management topology.

There are copper and fibre versions, with the S4048T being the former and S4048 the latter. Due to the different characteristics of the connection types, the S4048 boasts 600ns latency whilst the S4048T offers a still class-leading 2.5ms latency. The S4000 series is designed for virtualisation and, since it conforms to IEEE approved standards, follows Dell EMC Open Networking strategy, so the customer can choose the networking operating system that suits their needs from six alternatives, although Dell EMC own DNOS is the most popular. Dell EMC switches also have a clear cost advantage over the competition.
The importance of getting the right hardware for your workflow

Every business is different, and Dell EMC has a dedicated team to make sure hardware choices match the tasks a company actually plans to perform.

As we explained in the introduction to this booklet, there are many different workflows in the media and entertainment industry, and with the introductions of new content types like VR, the number is set to increase. Although there are commonalities across all of these workflows, the exact balance of components is highly contingent on the primary production focus of a particular company. There are lots of tools available from Dell EMC to help with this. For example, Dell EMC online Workstation Advisor (http://www.dell.com/solutions/advisors/uk/en/g_202/Precision-Workstation-Advisor) can provide assistance when choosing a workstation. It aids tailoring of hardware to specific needs. The Dell EMC Precision Optimizer can then ensure existing hardware is configured optimally for the intended usage.

But for most large purchases, the Dell Technologies Customer Solutions Centre is the hub where the problems are formulated clearly and the hardware ecosystems to solve these problems designed. For the UK, the nearest Solution Center is in Limerick, but facilities are positioned strategically all over the world, including North and South America, Europe, the Middle East, South-East Asia, Far East and Australasia.

The Dell Technologies Customer Solutions Centre comes with an array of representative hardware for testing, including workstations, monitors, networking, servers and storage. Any particular Dell EMC hardware model that is not part of the standard selection kept in house can also be obtained. Solution Architects work with a client throughout the process, starting with ascertaining the primary aim of the company’s business and the kinds of workloads that this will entail.

Dell EMC will then build a solution, and test it with the actual hardware suggested, for the client’s specific usage scenario. A key benefit here is that after the acquisition of EMC, Dell now has every hardware element covered, so they can all be included in the test. There will be no surprises when the solution is eventually installed, because the hardware has been tested end-to-end and shown to work as required. This solution will ensure that the whole vertical hardware stack will work together for the intended use. Dell EMC also has engineers for all the key product areas onsite so can call upon specific expertise when building a solution for a client.

For example, a client might be considering whether moving to centralised rack-mounted workstations operated remotely, or even virtual desktops, will be viable or have too great an impact on performance for the end user. The client can come in with their own models and test these with a variety of demonstration configurations, timing load-up sequences and running benchmarks to ascertain which option is best. In this example, it was possible to show that loading huge architectural models from a local array to virtual desktops hosted on PowerEdge servers was much quicker than copying them over the network to a physically local workstation. It’s even possible to include sample hardware from third-party vendors. For example, with VR, headsets can be tested, and the hardware optimised for client-side software platforms such as the Unreal Engine.

The true strength is in the consultancy and advice provided across a complete solution. With the vast majority of this now supplied by Dell EMC itself, the Solution Architects at the Dell Technologies Customer Solutions Centres can be absolutely certain they are providing hardware choices that are precisely fit for purpose and proven to be the best options for the intended workflow, both in terms of performance and usability. This is exactly what a company needs, so they can hit the ground running with a new hardware rollout. Over the rest of this booklet, we will look at some example configurations that illustrate the bespoke solutions Dell EMC can create for different media and entertainment business types.
Non-linear video editing is a data-intensive task, with workstations performing key roles but with a great thirst for storage. Although editors frequently copy video content to local storage for rapid access, this isn’t a particularly efficient way of working, and with multiple creative artists working the same files, this workflow can lead to conflicts, even with a well organised media asset management system. It’s also not efficient to keep plenty of copies of large files, for example, Sony 4K footage shot at 60 frames per second. Reality TV shows will also involve many different camera angles, which it won’t be beneficial to store all over the place.

A fully integrated system where the different artist roles are designed to fit seamlessly together and the data shared between them is a much better solution. This is what Dell EMC can offer. Dell Precision workstations would be used for ingesting video content, for example in DPX or OpenEXR formats, and this would then go to a centralised storage repository based on a cluster that balances speed and capacity, using a mixture of Isilon X and NL-series nodes. This could also incorporate an archiving tier using HD-series nodes.

During active post-production, using Dell Precision workstations loaded with NLE software such as Avid or Adobe Premiere Pro for which they are accredited, files would move to a fast S-series Isilon tier. However, this would be seamless to the user. There would be no isolated pools of storage, rather a single “data lake” that all workers can access using industry-standard protocols. The

Content Creation: Ingestion and Non-Linear Editing

Creating video content puts processing emphasis on the workstation, but with potentially huge storage requirements.

Whichever tiers files are on, the SmartPool technology means that they appear in the same place to the user.
OneFS Isilon operating system means that Linux workstations can use NFS, Windows workstations SMB, or there are HTTP and Hadoop Distributed File System (HDFS) options as well. Active Directory or LDAP would be used to ensure access privileges are enforced by user login no matter what kind of system they are using.

Whichever tiers files are on, the SmartPool technology means that they appear in the same place to the user. According to policies set by the systems administrator, files will move to higher-performance tiers when frequently used, and down to archiving tiers when not being accessed. They will always be available, and will be moved back up if required again. All the parts of the system would be networked together via Dell EMC S-series switches, offering low latency and full line-speed 10Gbit Ethernet connections.

The Isilon storage is very flexible, and can grow dynamically, since data is automatically restriped as nodes are added, for example taking about 60 seconds to move from 50TB to 75TB. After an upgrade, the OneFS view will look exactly the same to the user – it will just be a bigger pool. So there is no need to move data over to a new drive during an upgrade. In practice, a customer might not need to add to the top tier that uses expensive S-series nodes, but can add to the lower tiers for greater capacity.

Although non-linear editing will rely heavily on storage and workstations, compositing work could also involve sending jobs to a network rendering farm, consisting of PowerEdge servers configured for the task and loaded with the appropriate agent software, for example for Adobe After Effects, Autodesk Backburner, Lustre ShotReactor or Wiretap. This would also access the necessary content via the same Isilon OneFS repository, without the need to copy the raw files to the rendering servers when jobs are placed in the queue. Dell EMC will help a customer test all these aspects of the workflow in advance of deployment, so they can be certain the components work together properly.
Creating 3D content is a highly compute-intensive activity across the board, but the kind of computation depends on which part of the pipeline is currently being worked upon. The modelling and animation section of the workflow is aided a lot by 3D acceleration hardware and faster single-core clock speeds, but hardly at all by multiple CPU cores. When the time comes to render out the end results, however, the opposite is the case, with more cores the better, although game design doesn’t have the rendering stage, since this is performed dynamically by the gamer’s own hardware. A 3D artist may also want to render out a frame or two locally as a test, too. Nevertheless, as a result of these two very different stages, a networked combination of specialist hardware is the ideal configuration. Dell Precision workstations specified and optimised for 3D modelling and animation would be supplied for the 3D artists, although this could also be centralised rack systems accessed via PCoIP or even virtual desktops running on PowerEdge servers. In all cases, capable hardware 3D acceleration would be a necessity. So the Precision T5810, T7810 or T7910 are all ideal platforms, depending on specific needs, with the R7910 for centralisation or virtualisation.

For the rendering phase, highly dense racks of PowerEdge blade servers are optimal. Packing the most CPUs and cores into the smallest space, with the lowest power consumption and cost per node, is usually the best option. This would make the PowerEdge FX2 or M1000e ideal, with their support for huge CPU core density. However, GPU-based rendering is gaining ground, for example using NVIDIA’s iray. Dell EMC offers PowerEdge options for this scenario as well, such as the C4130.

Whilst storage for 3D may not initially appear like the huge requirements of video, it’s still extremely useful to have assets centrally available in a shared resource. So an Isilon OneFS file system with SmartPool tiers will ensure collaboration is as seamless as possible. The render farm would also be able to call upon the shared storage repository, so a network render would not mean a transfer of assets to another file system, just sending the render job to the queue.

Being a new form of content production, VR doesn’t quite fit the traditional separation between creating 3D content or CGI versus editing shot footage or compositing it with the 3D and CGI. Producing VR could be a combination of the two, but also with some special requirements of its own. Creating content based on 360 video footage will usually mean combining files from lots of different cameras into one spherical view, which will create the same data conundrums as a multi-camera reality TV shoot, with the same benefits to be had from the unified, shared Isilon OneFS file system.

However, content could also be created from scratch using 3D animation software and the same types of Precision workstations described above. The difference here is that previewing the end results will generally be through a games engine such as Unity or the Unreal Engine. A VR content creation workstation will need to be able to run these engines as well as it does the production software. Very powerful 3D acceleration with multiple graphics cards is a necessity, as found in the Precision T7810 or T7910. Dell EMC Solution Centers can help configure workstations with this in mind, and ensure they function correctly with the other components of the production workflow.
Video is one of the most bandwidth-heavy types of traffic on any network, even outside the media and entertainment content creation industry. But with uncompressed or losslessly compressed footage in TV and film resolutions, the data flow hits astronomical levels, particularly with 4K resolution and above. In its raw state, this is likely to be beyond the capability of even 10Gbit fibre for working with remotely across the network. So files may still have to be copied locally to the workstation for grading, then back to the storage server or another workstation afterwards.

A Dell EMC end-to-end solution can make this process much more seamless, using a Pixspan mathematically lossless compression platform. The Pixspan Bit Exact Round Trip compression works with a wide range of industry-standard video image formats, including OpenEXR, DPX, Cineon, ARRIRaw and Canon C500 Raw, and can typically reduce file sizes by 50 or 80 per cent, depending on the original format. The files appear to be native to the grading software, but are in fact arriving in the Pixspan compressed format over the network.

The compression is designed to be accelerated by NVIDIA GPUs, so Dell Precision workstations incorporating an appropriate Quadro should be specified as the grading software platform. The Quadro M6000 or P6000 are recommended, making Precision T7810 or T7910 the preferred hardware. The footage itself will be maintained on Dell EMC Isilon storage, with S-series nodes used for footage currently being worked on, and then X-series, NL-series and HD-series nodes as the content becomes archived.

However, before footage becomes available for any kind of editing or grading, it must be ingested into the media asset management system. This is the stage during which it is losslessly converted from the native format of the acquisition device, such as a digital film camera, to the Pixspan intermediary. For this part of the process, a dedicated Pixspan compression appliance will be called upon, and this would be created using a PowerEdge server loaded with the compression software configured with NVIDIA GPUs to accelerate the compression processor.

The benefit of the Pixspan compression is not just that it reduces the network data throughput of video by at least a half, but also has the same effect on the storage requirement. So less than half the capacity will be necessary, which will be particularly beneficial for the most expensive, fastest nodes, which might be specified as All Flash or S-Series.

Any file transfers will be taking place across the network, served by the low latency and dependable throughput of a Dell EMC S4000 series switch. With this end-to-end solution, it’s possible to grade 4K video seamlessly with, for example, Da Vinci Resolve across a 10Gbit Ethernet network using Dell’s UltraSharp 32 4K monitor - UP3216Q. Pixspan technology is also incorporated directly into the Autodesk Flame family of products.

It’s clear from this description that there are definite benefits for reducing networking congestion and the requirements of storage capacity. However, it’s also clear that such a system is more complicated than a simple file storage provision with workstations attached to a network. Fortunately, with all the hardware elements coming from Dell EMC, an example setup can be created at a Dell Technologies Customer Solutions Centre and fully tested. This can then be used as the template for deployment, so that when the hardware is rolled out at the post-production studio, it will slot in and work as expected. The local systems administrators can also become familiar with the system during the test, so they are ready to support it immediately as well.
Video production has been purely digital for decades, and film has followed suit more recently. One of the benefits of all content being in the digital realm of files is that there is potentially a seamless workflow all the way through from acquisition and content creation to broadcast and on-demand distribution. The rise of on-demand services like Netflix, Amazon Prime and BBC iPlayer is also causing particular pressures for content storage, since programming will need to be available to access for much longer than a timed broadcasting slot.

The integrated approach now available from Dell EMC is well suited to this new era. Precision workstations can be used for the creative tasks and ingestion. Content would be copied across a network using Dell S4000-series switches as with the earlier example of non-linear editing, and placed on the storage pool provided by the Isilon tiers. A PowerEdge cluster would be available for rendering graphics and effects.

However, the Isilon storage comes to the foreground in the delivery process, and in particular the tiered way it deals with its capacity. As with other examples, S-series or All Flash nodes would be used for the production, after which content would be moved down to a cluster consisting of X-series and NL-series nodes. This cluster could then be directly connected to another S-series node cluster with the finished content, which then handles live delivery over the air and to cable and satellite viewers. PowerEdge server clusters would deal with the encoding and multiplexing required for broadcast. The Content Delivery Network (CDN) used for streaming can draw directly on this Isilon cluster when delivering content to mobile devices and
A major difficulty for on-demand and Internet-streamed live content is the plethora of formats that are necessary. Unlike an over-the-air broadcast channel, which delivers one format only, streaming and on-demand will entail a plethora of formats, resolutions and data rates, which will need to be encoded on-the-fly or in advance (for example with a PowerEdge cluster). The BBC once admitted that it needed to create over 20 different versions of every TV programme made available on iPlayer, to cope with all the different device types and connection speeds its viewers were using. Allied to this, the storage required for the native files from a TV programme are increasing all the time. The Amazon Prime series The Grand Tour, for example, is shot at 4K in HDR and requires 20-40TB of data per episode.

Services like Netflix, Amazon Prime, BBC iPlayer, and Hulu are part of a “long tail” of content where the value that they provide is that content can be made available long after the majority of people want to consume it. The viewing figures then don’t come from everyone watching one piece of content at once, but lots of content being available for long periods, with each one only being viewed a few times a day, so that the aggregate is as big as a primetime broadcast.

The huge storage facility available from Isilon HD-series nodes, which can handle up to 68PB in one cluster yet still make it seamlessly part of the pool, means that this need to keep huge amounts of video content online for a very long time can readily be met. The Isilon system means that the capacity can be dynamically increased as required, too. With Dell able to provide consultancy on the whole of the system from ingestion to delivery, again there is a reliable partnership available for content companies looking to develop solutions that they know will deliver content to their customers in all the formats they want to use.
The Importance of Hardware Certification

Running mission-critical software on non-certified hardware is not recommended, but fortunately Dell EMC now has a strong track record in this area.

The standards-based modular architecture of computer workstation and server hardware is supposed to mean that any software should run on any hardware. But in reality that is never the case. The vagaries of particular hardware and driver combinations mean that there is no guarantee that a piece of software will run optimally on every possible configuration. For this reason, independent software vendors (ISVs) will rigorously test their applications with specific hardware platforms and driver versions, and only certify combinations that pass the test.

The indirect consequence of this certification process is that ISVs will tend not to provide the same level of support for hardware and driver combinations that aren’t on the approved list. They may not even be willing to provide any support at all. As a result, it’s not advisable for a media and entertainment company to use non-certified platforms for its flagship mission-critical software. Hardware purchases should revolve around what has been certified for the software that a company wants to run.

Fortunately, Dell EMC has now been self-certified for one of the most important software platforms in media entertainment, Autodesk Flame. Flame v2017 extension 1 has been Autodesk approved to run on Dell Precision T7910 workstations, with a Xeon E5-2687W processor, NVIDIA Quadro M6000 graphics, 64GB of DDR4 ECC SDRAM, a pair of 256GB SSDs, and CentOS Linux Version 7.2 (1511). The first company to take advantage of this – on the very first day of availability – was Chimney, a post-production and VFX company based in Sweden but with studios all around the world.

“We held out on doing a Flame refresh until the Dell platform became certified,” explains Chimney’s CTO Niklas Aldergren. “This gave us the latest and greatest in hardware specification, and also saved us at least 30 percent in hardware costs. The option of liquid cooling also means the workstations are so quiet we can put them in the suites, instead of installing them remotely in the machine room with access via KVM. This saves on the complication and expense of the Fibre links for the KVM – another benefit.”

Chimney is a prime example of a facilities house where certification is a fundamental necessity for hardware partners. The company also runs Adobe Creative Cloud applications, Autodesk Maya, Foundry’s Nuke, and Avid Media Composer. Most of these applications have specific needs when it comes to supported platforms. Chimney has 50 Avid Media Composer seats running on certified Dell Precision workstations.

There are associated benefits from running software on certified hardware, too. There will be a pool of knowledge about how to get that hardware running as smoothly as possible with the software, either via the ISV itself or from third-party users. For example, configuration guides can be found for Autodesk and Avid software with certified hardware, where people have done the work already and it’s not necessary to do the testing afresh, since the configuration has been shown to work.

Hardware certification isn’t essential for every software platform, and some ISVs only list certified components rather than entire hardware platforms, so any vendor using those components will meet the requirements. But for some, particularly complicated applications there is no other choice. “For client-attended sessions, there isn’t a margin for experimenting,” explains Aldergren. “Flame is a highly technical piece of software requiring a very specific piece of hardware and we want something that both software and hardware vendors will support. It’s not an environment where you want to take a lot of chances, and there’s a huge benefit in having a system that you know will work. Dell EMC offers us that.”

“We held out on doing a Flame refresh until the Dell platform became accredited,” explains Chimney group CTO Niklas Aldergren.
Conclusion: Getting the Balance Right

Dell EMC offers hardware for every type of workflow in the media and entertainment industry, but most importantly it will help companies make the correct choices for their workflows.

We have looked at how Dell EMC products have helped one of the leading animation and VFX houses in the world, Animal Logic, achieve its goals. We have looked at the key models in the five Dell EMC product ranges that are most appropriate for the media and entertainment industry. We then drilled down to see how the various parts of the ecosystem would fit a representative selection of workflow categories, showing that Dell EMC broad ranges can cover every requirement.

It was clear from this selection that one size does not fit all. Video editing is very focused on storage, due to the sheer volume of data that is required for video content, particularly now resolutions have increased to 4K and beyond. Animation requires fully optimised, powerful workstations, and render farm servers with a high core density for the output stage. The arrival of VR puts even greater emphasis on the potency of the workstations required for content creation, since they will also need to be able to preview the VR experiences as they are created.

Many important tasks within various workflows will need professional grade monitors that can reliably reproduce colours, show content in high level of detail and can connect seamlessly with Precision workstations. Dell UltraSharp monitors with PremierColor are ideal for such purposes and offer the same quality and reliability that has made Dell monitors the #1 monitor brand in the world for 4 years running!

The huge and ever-expanding storage and bandwidth requirements of video and digital film production can be alleviated with the Pixspan workflow enhancements we detailed. This is still a very storage-heavy provision, with the necessity for dedicated encoding appliances. But it can make the current and next generation of video resolutions editable over a standard 10Gbit Ethernet network.

Content distribution can now be linked directly to the same storage system as the post production workflow. The tiered approach provided by Dell EMC Isilon storage means that archived content can still be available via the same universal file system as content being held on fast nodes for active post-production. This tiered approach also means that produced content can be made available for longer via on-demand systems, and easily transferred to CDNs for live streaming.

With all these different combinations of the same basic building blocks, it’s fundamentally important that companies are able to create configurations that are right for their specific workflows. These vary by type in the ways described above, but in reality every company, even in the same basic area of business, is different, and will want to go about things in their own way. This is likely even to be what gives them their competitive advantage.

Although the quantifiable benefits of computing products generally revolve around performance, price, and how those two interrelate, in fact these aren’t the only or even the most important factors in a hardware purchase in the media and entertainment industry. Much more significant is whether the vendor actually understands the business, and the particular workflows a company will be engaged in. As we have shown, although these revolve around a basic theme of similar component types, the specifics vary greatly.

Dell EMC not only understands the work its clients in the media and entertainment industry do, but also provides facilities at its Solution Centers and expertise from its Solution Architects where hardware combinations can be set up and tested in realistic examples of a production environment, using the software that will be run and a company’s own content samples. Thanks to Dell EMC being able to offer a range of choices for every significant hardware category in a media and entertainment workflow, companies in this industry can be sure that they are making the most appropriate hardware choices for their creative needs.

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