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Using technology to help transform the cinematic experience

James Cameron's Lightstorm Entertainment taps Dell Technologies to solve digital cinema challenges in films such as Avatar 2.
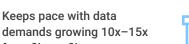

Lightstorm's stunning films rely on innovative digital technology. To capture facial expressions, motion and reference data, and audio for immersive, engaging storytelling, the company needed storage, server, data protection and security solutions that could accommodate the needs of hundreds of artists and ensure efficient productions.

Business results

- Meets the challenge of storing hundreds of millions of files.

- Keeps pace with data demands growing 10x–15x from film to film.

- Replicates and cross-checks data between online and nearline sites.

- Reduces the risk of data loss or theft by archiving data to a private cloud.

- Provides compute power to drive massive image-render farms.

Solutions

- Dell PowerScale
- Dell ECS
- Dell PowerEdge
- Dell VxRail

Lightstorm Entertainment is an independent production company headed by James Cameron and producing partner Jon Landau. Its productions include some of the industry's biggest hits, including *Terminator 2: Judgment Day, True Lies, Titanic, Avatar* and *Avatar: The Way of Water.*

Films in a sci-fi series such as *Avatar* require not only extraordinary imagination and creativity, but also highly sophisticated technology. In 2011, Lightstorm partnered with Dell Technologies for data storage, compute, virtualization and networking solutions to overcome immense challenges and bring these films to the big screen.

"Dell Technologies offers the gold standard in solutions across our technology-powered virtual production environment," says Tim Bicio, chief technology officer at Lightstorm. "We rely on Dell PowerScale and Dell ECS for storage, Dell PowerEdge servers and Dell VxRail hyperconverged infrastructure appliances."

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CHIEF TECHNOLOGY OFFICER, LIGHTSTORM ENTERTAINMENT

Capturing, managing and moving data

Lightstorm employs a virtual approach that brings together skilled filmmakers, accomplished performers and technology to create photorealistic, computer-generated (CG) renderings of storytelling moments — over and over again. This places a premium on efficiently managing, moving and storing data.

During performances, Lightstorm uses as many as two dozen reference cameras at once to capture performers, plus stereo facial cameras, a virtual camera feed, motion and reference data, and audio — to "film" characters in virtual 3D worlds or composite computer-generated and real-world environments. This can generate as many as 30 to 40 data streams at a given time.

Lightstorm's custom BinSync replication tool converts database records into lists of production files and dependencies required to open complex scenes, so they can then be replicated to remote production sites in far-off lands. Sync requests are often enormous, consisting of tens of millions of files in a single data set.

"In the past, our biggest budget line items were top-quality cameras and film," Bicio recalls. "Now, it's sophisticated storage that can support our virtual camera system, stage capture, live action and digital lab's production workflows — with hundreds of artists accessing files at once and a similar number of render processes taking place."

Dell Technologies' scalable storage and server infrastructure enables Lightstorm to keep pace with the exceptional challenge of handling hundreds of millions of real-time files — stored at three major production sites worldwide.

It starts with PowerScale's high-performance, scale-out storage for both online production and nearline storage. With PowerScale SyncIQ, Lightstorm natively replicates critical production data every few hours to its nearline facility.

"We realized with Avatar how important data was going to be, so we decided to expand our capabilities," explains Bicio. "PowerScale helps us solve the challenges of reliable storage and tiering, movement and ready access to data for our films."

Securely archiving to a private cloud

To preserve and access all this media, Lightstorm archives data to a private cloud built on the Dell ECS platform and mirrored across a minimum of two production sites. The archival process is largely automated, with cross-checks as needed before data is removed from the PowerScale-based production solution.

"Archiving used to be so much more complicated with tape," Bicio remarks. "Our data storage requirements on Avatar: The Way of Water were in excess of 10x what they had been in the past. Yet with ECS, we can now easily archive petabytes of data with a roadmap to archive some post-release data to a colder tier in the cloud."

Disaster recovery snapshots are also aggressively taken at Lightstorm's production site, and less frequently at the nearline site as well. "Digital security is a top priority for us," notes Bicio. "With our films being 100% digital, snapshots and cybersecurity protections built into PowerScale and ECS help us sleep at night."

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Delivering needed compute power

To power its render farm and virtual compute infrastructure, Lightstorm chose Dell Technologies' PowerEdge servers and VxRail hyperconverged platform.

"The creative teams on our films work extensive hours during the peak of production, and our technology has to power through these peak workloads reliably and effortlessly," Bicio relates. "The world of Pandora once only existed in James Cameron's imagination. Then, a team of talented concept and 3D artists went to work — converting that world into petabytes of data stored on PowerScale and ECS."

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Bicio continues, "My top concern as a CTO is to future-proof technology the best that I can. Investing in high-performance, highly scalable storage and compute infrastructure is key. Dell Technologies has been a valued partner for more than a decade and will continue to play an important role into the future of our franchise."

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