DreamWorks Gets Closer to Setting More Records

HP solutions deliver 60+ percent more throughput to help the studio break new ground faster than ever.

"We had an unprecedented three movie releases in 2010 that were all stereoscopic 3D, and we couldn't have done them without the Intel® Xeon® processor 5500 series-based HP ProLiant servers."

Ed Leonard, CTO, DreamWorks Animation SKG

Objective

Boost rendering throughput while minimizing power consumption, and improve backup and archiving service capabilities

Approach

Deploy HP ProLiant G6 server blades, HP StorageWorks EVA, and HP StorageWorks X9000 Network Storage systems

IT improvements

- 60+ percent more rendering throughput
- 30+ percent more performance per watt
- Minimized server administration through remote management
- Service-level agreements in backup and archiving met or exceeded
- Search and retrieval of usable assets in seconds instead of days

Business benefits

- Multi-million dollar power capacity upgrade deferred
- Key enabler to render capacity for an increased production slate
- Enhanced creativity from the ability to support more rendering

Popcorn, please

It's one of life's most universal pleasures: enter a movie theatre, sit back in a comfortable chair, watch a screen, and be swept away.

DreamWorks Animation SKG (DreamWorks) delivers this pleasure better than most. Out of tens of thousands of titles released in over 100 years of cinema, two DreamWorks movies (*Shrek 2* and *Shrek the Third*) are among the top 20 highest-grossing films of all time in the United States.*

There are plans at DreamWorks to set more records—and one of the bottlenecks has been the computer.

"We hire people who have unbounded imaginations," explains Ed Leonard, CTO, DreamWorks Animation SKG. "Our job as technologists is to position technology as a creative enabler as opposed to a constraint to our film makers' creativity."

*"All Time USA Box Office," www.imdb.com/boxoffice/alltimegross, visited 9 December 2009.

"Every pixel on screen needs to be designed, approved, created, rendered and lit with specific intention," says Hans Ku, alliance manager at DreamWorks. "Everything is created from pure imagination in a computer graphics movie," he points out. "And that's why we're so reliant on compute and our partnerships with Intel and HP. You can only put as much on screen as the compute capacity allows."

What's next?

To keep up with their creative imaginations, DreamWorks keeps increasing demands on its compute capacity, with

Bigger movies: The original *Shrek* used six terabytes of data. *How to Train Your Dragon*, nine years later, used over six terabytes for a single sequence, more than 90 terabytes in total.

More movies per year: As the largest animation studio in the world, DreamWorks produces five feature films every two years—three in one year, two in the next.

Stereoscopic 3D: As seen in DreamWorks' current release, *How to Train Your Dragon*, stereo 3D is the best way to experience computer animated films. This new standard was championed by DreamWorks and has set a new bar for the high-quality theatrical experience. It requires separate images for each eye, boosting rendering requirements by more than 30 percent.

These challenges add up

The overall effect is that more movies need to be produced each year, and each title requires more data, more creativity, and more rendering. As a result, compute capacity was needed fast—and available power at the studio's Glendale, California data center was running out.

Then HP introduced the HP ProLiant G6 server blades with the Intel Xeon processor 5500 series.

The results need to be seen on screen. *How to Train Your Dragon*, *Shrek Forever After*, and *Megamind* are all being released in 2010.

Observes Leonard: "We did *Monsters vs. Aliens* (2009) on the previous generation of hardware. But with three movies with significant schedule overlap and that were all 3D, we couldn't have done them without the power of Intel's Xeon processor 5500 series and HP's ProLiant servers."

This is how the bottleneck at DreamWorks is getting wider—and room for the imagination is getting bigger.

60+ percent more rendering throughput

Approaching deadlines made the animation technology team evaluate four or five options for increasing compute capacity, Derek Chan, head of digital operations at DreamWorks explains. "We started to draw up all kinds of plans to move servers around, shift the load, and look for new data center space at other locations. Meanwhile, testing in our environment showed that HP ProLiant BL460c G6 server blades with Intel Xeon processor 5400 series have a total throughput more than 60 percent greater than the Intel Xeon processor 5400 series, the previous generation."

A key factor behind the gain is the improved memory bus architecture in the Intel Xeon processor 5500 series, Chan points out.

"In our environment, HP ProLiant G6 server blades have a total throughput more than 60 percent greater than the HP ProLiant G5 server blades, and deliver more than 30 percent better performance per watt than the servers they replaced."
Derek Chan, head of digital operations, DreamWorks Animation SKG

Avoiding a multi-million dollar infrastructure upgrade

The new G6 servers are also more energy-efficient, Chan adds. "With our render loads, HP ProLiant G6 server blades deliver 30 percent better performance per watt than the servers they replaced," he notes. "We've been able to defer a multi-million dollar infrastructure upgrade that would have added electrical capacity to our Glendale campus. And we've added headroom that has enabled us to take on projects such as rendering a TV special in addition to our movies."

Boosting creativity with faster rendering

Faster results enable more creativity, notes Lincoln Wallen, head of R&D at DreamWorks. "Tying together multiple HP ProLiant server blades is key step toward the ability to do more interactive rendering and visualization," he explains. "Until now, there's been a fairly long turnaround time from when an artist creates the description of what they want their scene to look like and when they can actually realize their vision on the compute farm."

The wait has been cut. "We now have a multi-machine application called the mini-farm," Wallen notes. "Using HP ProLiant servers, lighting artists can re-shade part of their scene in a matter of seconds to minutes, as opposed to hours."

> **"Using a "mini-farm" of HP ProLiant servers, lighting artists can re-shade part of their scene in a matter of seconds to minutes, as opposed to hours."**
>
> Lincoln Wallen, head of R&D, DreamWorks Animation SKG

Turnaround times will get even faster as DreamWorks developers re-architect their single-threaded applications to take advantage of parallelization using multi-core Intel Xeon processors. The result, Wallen says, is that "earlier in production, we'll be able to animate in higher resolution and in a fully lit environment. This is something we don't do today until the end. Now we animate a few characters at a time in a very sparse environment." The change will give artists a better opportunity to see the scene they envision.

Remote management saves time

DreamWorks uses HP remote server management capabilities to minimize server administration time and enable the IT staff to focus on more valuable tasks. "Using HP iLO 2 Advanced Pack and the HP ProLiant Onboard Administrator, we can do almost everything remotely that we could do standing in front of the server," notes Scott Miller, staff engineer at DreamWorks. "We can power cycle, upgrade software, firmware—all those kinds of tasks remotely."

One result is that the team is able to administer a remote installation of HP ProLiant server blades in another state as a lights-out, unattended facility. This is enabling a test of DreamWorks' compute model in a location where power costs 75% less than it does in Southern California.

A new edge from storage

DreamWorks uses an HP StorageWorks 4400 Enterprise Virtual Array to host a backup system database and an HP StorageWorks 6400 EVA as a disk-based staging pool for backup. Together, the systems provide 70 terabytes of storage.

"The HP StorageWorks EVA storage systems enable us to support more primary storage and faster tape drives than we could before," Miller says. "We're able to meet or exceed our service level agreements for backup and archiving."

The systems were simple to deploy, Miller says. "HP storage management (HP Command View EVA software) tools provide dynamic allocation of capacity," Miller adds, "which lets us add or remove LUNs without affecting the underlying disks—and we can add disks on the fly."

Retrieving images in seconds instead of days

Another key need at DreamWorks is to have cost-efficient storage for a 70+ terabyte movie once it is finished. Not long ago, completed productions were migrated to tape to reclaim costly primary storage space.

But assets on tape are harder to search and retrieve, and that is a drawback if a sequel is being made. To speed up search and retrieval, DreamWorks evaluated network attached storage (NAS) options and chose the HP StorageWorks X9720 Network Storage System.

"Because floor space is an issue, we are very excited the X9720 can fit 820 terabytes into just two rack spaces," says Miller.

The HP X9720 system can also use up to 16 HP ProLiant server blades as a filer or NAS head that takes requests from applications. Some competing NAS systems, in contrast, have only one NAS head.

"Retrieval time with the X9720 is interactive," Miller observes. "For tape it could have been days. We found this system at just the right time because *Madagascar 3* is already underway, and we needed fast, cost-efficient retrieval for *Madagascar 2* assets."

"Over the last several years, the move towards higher definition content and richer customer experiences has driven explosive growth of our file content," says Chan. "The only way for us to efficiently manage the mountain of file data is by using scale-out file systems like those from HP StorageWorks. The HP StorageWorks X9000 system enables scalability and automated tiering of information to help balance cost and performance so that we can archive information for long-term storage and enable high-speed graphic rendering within the same global namespace for easy management."

HP has been a strategic partner of DreamWorks since 2001, when the companies worked together on *Shrek* and it went on to win the first-ever Oscar for an animated film.

"HP is increasing our capability of producing a final product that is always state-of-the-art CG animation—great storytelling combined with stunning visuals," Leonard says. "And that's what audiences expect. They want to see something in the theater that is better than what they saw last year in every way, including story, character design, quality and visual richness."

"Art is never finished, only abandoned"

The most recent improvement being made is summed up by a quote from Leonardo da Vinci: "Art is never finished, only abandoned."

"It's one of my favorite quotes," Miller says. "The notion behind it is that an artist really wants to fine-tune the product, but often has to stop because of some other external force, like a release date or some other schedule pressure."

HP solutions like the G6 server blade enable artists to test more in a shorter amount of time, adds Miller. "Having faster tools for better turnaround means artists can iterate more and create a finer piece of art, and maybe not have to abandon it so soon—or be able to fix something that there wouldn't ordinarily have been time to fix," he says.

The end result is that DreamWorks can release three movies—*How to Train Your Dragon*, *Shrek Forever After,* and *Megamind*—all in the same year. "Five years ago," Leonard notes, "doing one movie every two years was considered very ambitious."

Adds Leonard: "In the original *Shrek* movie, the dragon presented quite a challenge to produce because of the compute capacity required to animate, render and light it. *How to Train Your Dragon* includes over 100 dragons, some with more than double the animation controls, and combined with wind, rain, smoke, explosions and, of course, lots of great fire breathing effects. We wouldn't be able to consider the full potential of a movie like *How to Train Your Dragon* without the compute capacity of HP ProLiant G6 servers."

In darkened theatres everywhere beginning 26 March 2010, audiences have been sitting down to munch popcorn and be the final judge of the results.

Share with colleagues

Get connected
www.hp.com/go/getconnected

Get the insider view on tech trends, alerts, and HP solutions for better business outcomes