



Case Study

Entertainment

Quad-Core Intel® Xeon®
processors

Intel® Multi-Core Performance Enhances Creativity at Sony Pictures Imageworks

Sony Pictures Imageworks deployed 3,000 new cores with Quad-Core Intel® Xeon® processors to help power the animation and digital effects behind its blockbuster films, including *Spider-Man™ 3*, *Surf's Up*, *Beowulf*, and *I Am Legend*.

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- Challenges**
- Achieve the immense processing performance required to generate cutting-edge animation and digital effects for film
 - Minimize power and real estate required for the Sony Pictures Imageworks data center by creating a dense data farm

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- Solutions**
- Sony Pictures Imageworks added 3,000 cores to its data center with Quad-Core Intel® Xeon® processors to deliver the performance needed with low power consumption and a small physical footprint

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- Benefits**
- By deploying high-performance servers with Quad-Core Intel Xeon processors, the Imageworks team enhanced the complexity and quality of its digital effects and animation
 - The Imageworks team created a dense data farm that delivers outstanding performance while controlling power and real estate costs

The work of Sony Pictures Imageworks has garnered deep respect within the film industry and made lasting impressions on millions of moviegoers worldwide. This Academy Award®-winning digital production studio has produced stunning visual effects and character animation for a wide range of lauded and loved films, including last year's *I Am Legend*, *Beowulf*, *Surf's Up*, *Spider-Man™ 3*, and *Ghost Rider*. Creating the effects and animation that propel those films takes immense compute power. Recently, Imageworks added 3,000 cores to its render farms with Quad-Core Intel® Xeon® processors to enhance the quality of its work while creating a dense data farm that could keep power and real estate costs under control.





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Bill Villarreal
Vice President of
Technology
Sony Pictures Imageworks

Challenges

Sony Pictures Imageworks has captivated film audiences around the globe. “We have had the privilege to work a number of groundbreaking films over the past 15 years,” says Bill Villarreal, vice president of technology at Sony Pictures Imageworks. “In the past year, we produced and released two full computer-generated animated movies—*Surf’s Up* and *Beowulf*. We are the only facility in the industry producing that volume of work. We are also the only facility that is creating both visual effects films and computer-animated films simultaneously.”

To deliver the immense processing power required to create its animation and digital effects, the Sony team has assembled a gigantic data center. “Currently our data farm includes about 8,500 cores,” says Villarreal. “It’s a massive infrastructure, but we need it to produce those effects.”

Whenever the Imageworks team needs to refresh servers or add computational power, it evaluates processing architectures according to rigorous performance standards. “We have a set of tests that we run on all processors we’re evaluating,” says Villarreal. “For example, we measure rendering speed, and we examine potential I/O bottlenecks as well. Power consumption is also a key factor in our evaluation.”

BEOWULF- Image courtesy of Sony Pictures Imageworks. ©2007 Paramount Pictures and Shangri-La Entertainment, LLC. All Rights Reserved.

Processing performance will always be a primary consideration for selecting servers for the data farm, but increasingly efficiency is also a critical factor. “With that many processors in our data center, we face challenges in delivering the electrical power required,” says Villarreal. “It’s a problem for many companies today, not just those in the visual effects and animation field. Finding the most power-efficient architecture has become a major goal for us in the last few years. When we evaluate processors now, we always weigh efficiency along with performance.”

Key Technologies

- Quad-Core Intel® Xeon® processors
- Dell PowerEdge® servers

“By adding servers with Intel® multi-core processors to our data farm, we can produce more complex and higher-quality effects.”

Bill Villarreal, Vice President of Technology, Sony Pictures Imageworks

During the selection process for the Sony team's most recent server acquisition, minimizing the space to house the servers was also a concern. “We were physically outgrowing our primary data center—we were running out of space and power,” says Villarreal. “So we needed to find a solution that would allow us to squeeze significant processing power into a small physical footprint. The new server architecture had to lend itself to a dense data farm.”

The new acquisition had to happen quickly. Creating “Sandman” for *Spider-Man™ 3* required significant processing power, yet the Imageworks team working on the film had to share its server resources with other films in production. To complete the film and prepare for the next projects in the pipeline, the team needed more compute power. “Sandman posed some unique challenges for us,” says Villarreal. “The effects we created were very processor-intensive. As the film progressed, the director envisioned even longer shots with that character. Those creative and technical demands required more resources, and we had to figure out a way to accommodate those demands while simultaneously supporting other projects in production. To make all of our deadlines, it was clear that we needed to augment our data farm.”

Solution

After evaluating processor architectures from a series of hardware vendors, the Imageworks team chose solutions from several vendors. First, Verari Systems provided



servers with Dual-Core Intel® Xeon® processors to complete *Spider-Man™ 3*. To meet the needs of *Beowulf* and *I Am Legend*, Imageworks then augmented its infrastructure by deploying Dell PowerEdge* servers with Quad-Core Intel Xeon processors. The team added 3,000 cores in all. “The Quad-Core Intel Xeon processors enabled us to fit the quantity of processors we needed into our data center while keeping the power and physical footprint under control,” says Villarreal. “We were able to finish all three films simultaneously with those additional cores.”

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About Sony Pictures Imageworks

Sony Pictures Imageworks Inc. is an Academy Award®-winning, state-of-the-art digital production studio dedicated to the art of visual effects production and character animation. The Imageworks production environment facilitates four diverse pipelines, including live-action visual effects and character work, Imagemotion™ performance capture, all-computer generated (CG) animation, and Imageworks 3D stereoscopic.

The company's achievements have been recognized by the Academy of Motion Picture Arts and Sciences with Oscars® for its work on *Spider-Man™* and the CG animated short film *The Chubbchubbs!* Most recently, *Surf's Up* was nominated for this year's Academy Award for Best Animated Feature. In 2007, two of Imageworks' projects, the all-CG animated feature *Monster House* and *Superman Returns*, were nominated for Academy Awards in the Best Animated Feature and Outstanding Achievement in Visual Effects categories, respectively. With those two nominations, Imageworks became the first studio to be recognized in the same year in these distinct areas, an indication of the diversity and quality of the company's capabilities. Other Oscar®-nominated projects include *The Chronicles Of Narnia: The Lion, the Witch and the Wardrobe*, *Spider-Man™*, *Hollow Man*, *Stuart Little*, and *Starship Troopers*, for a total of nine nominations.

Imageworks' most recently completed projects include Robert Zemeckis' *Beowulf*, also made in 3D stereoscopic, and *I Am Legend*.

For more information, please visit www.imageworks.com.

In addition to benefiting from the sheer processing gains of adding so many cores, the Imageworks team intends to take advantage of the multi-core technology to enhance the efficiency of its rendering applications. “The new, in-house rendering application will take full advantage of the multi-threaded environment,” says Villarreal. “We expect to see a significant increase in throughput by using a multi-core architecture.”

With a dense server architecture, the Imageworks team was also able to continue its work without having to invest in more physical space for servers. “We bought 3,000 cores and fit them into just seven racks,” says Villarreal. “A few years ago, we might have needed over 20 racks for the same processing power—that’s

a tremendous difference. By packing more processing power into less space, we expect to save significantly on power costs. Most importantly, though, having these dense servers enables us to fit into our existing space.”

More processing power should help the Imageworks team handle the rapidly increasing demand for digital effects in films. “Movies today require more and more visual effects—even the simplest, non-effects movies use digital effects. A director might want to add or remove something from background. Those elements might not be obvious to the viewer, but they require visual effects work,” says Villarreal. “The addition of the new multi-core servers will help us address that growing demand for effects.”



Intel® architecture helps enhance the quality of digital effects

Adopting multi-core Intel® processors will have direct consequences for the creative process. "In the creative world, a shot, frame, or image is never really done.

Directors and artists continue to tweak those shots right up until the deadline, when the film has to be delivered," says Villarreal. "With the processing power we gained by adding Intel multi-core processors, our artists can create more iterations of a frame during the course of the project to experiment with effects. Faster rendering times will enable artists to better realize their creative vision."

Increased processing power will also help enhance the quality of the work produced by the Imageworks team. "Above all else, what we gain with faster processors and improved performance is quality," says Villarreal. "*Beowulf*, for example, is completely computer generated, with a surreal quality to it. We rendered our characters with complex hair, beards and eyes, and we created motion effects for fire and water. Those are complex effects that require immense processing power. By adding servers with Intel multi-core processors to our data farm, we can produce more complex and higher-quality effects."

Those improvements could have an important impact on the business. "The better our work looks on the screen, the more our reputation as one of the most talented and forward thinking digital effects and character animation studios continues to grow," says Villarreal.

Imageworks casts Intel in a leading role for the future

With the augmented data farm in place, Imageworks is now working with Intel on additional projects and is having discussions with several Intel groups about possible work in the future. The Imageworks team also is working with Intel to help optimize the management of a new data center in New Mexico. The goal is to create a network that will enable Imageworks artists in Los Angeles to draw on the processing power of servers located 1,000 miles away.

In addition to addressing specific challenges, Intel is providing the Imageworks team with insight into emerging technologies. "Having access to the Intel roadmap helps us tremendously," says Villarreal. "To stay at the cutting edge of visual effects, we need to be on the cutting edge of technology. Knowing what's ahead enables us to plan both fiscally and technically so we can continue to produce stunning, high-quality films."

***SURF'S UP- Image
courtesy of Sony
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