

CHALLENGE	SOLUTION	BENEFIT
Implement a computing architecture to process terabytes of image data efficiently and cost-effectively	Intel® Pentium® III processor-based server farm composed of Dell™ PowerEdge™ 2550 servers running the Red Hat® Linux® operating system	Time and cost savings by digitally remastering 7 TB of image data in 10 weeks

An out-of-this-world performance

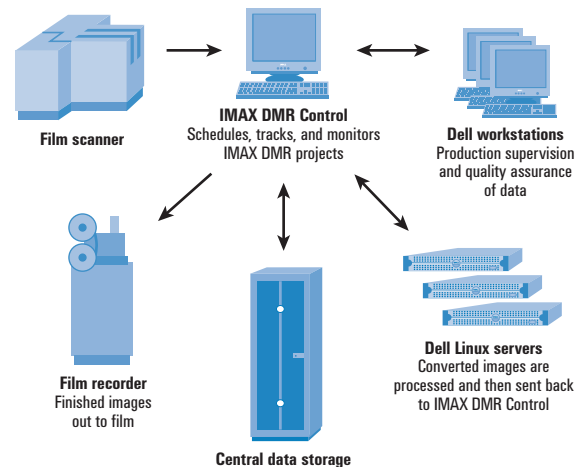
IMAX digitally remasters live-action Hollywood films using Intel processor-based Dell PowerEdge servers running Linux, and launches the project with the blockbuster *Apollo 13*

When movies project onto an IMAX® screen—up to eight stories tall and 170 feet wide—they use stunning 3D technology to transport audiences to new worlds. Over the last three decades, the giant and life-like images projected in IMAX theaters have enabled more than 700 million viewers to experience Africa without mosquitoes, Mt. Everest without frostbite, and great white sharks without fear. Today, 225 specially designed IMAX theaters in 30 countries offer The IMAX Experience®.

As an entertainment company, IMAX Corporation has set out to provide the best entertainment experience available through new technologies. In the past, films created specifically for IMAX were shot on special large-format film that would display on an IMAX screen. But the latest technology from IMAX—the IMAX DMR™ (Digital Re-Mastering) technique—transforms standard 35 mm feature films into a large-frame 15/70 format. DMR technology enables audiences to view Hollywood blockbusters on a magnitude never before seen.

Movie magic happens behind the scenes

As IMAX digitizes live-action Hollywood features, the company needs massive computer power to crunch through terabytes of image data. Proprietary IMAX DMR software mathematically analyzes each frame of film and extracts the important image



IMAX DMR server configuration for render farm

elements from the original grainy structures to create larger, pristin forms of the original images.

State-of-the-art digital image processing algorithms enhance resolution and reduce noise, resulting in clearer, sharper images. The process adjusts and sharpens colors for the unique characteristics of the IMAX screen. Then, the remastered film is transferred onto the world's largest film format. IMAX DMR also remasters the

original soundtrack of the film, adding another important dimension to enhance and upgrade the original movie soundtrack to IMAX standards. When the conversion process is complete, a typical two-hour motion picture can contain a whopping 7 TB of image data.

Digitizing a single image frame, which can generate approximately 50 MB of image data, requires massive data computation. “One of our greatest challenges was to find an efficient computing architecture for processing such a large amount of image data at a reasonable cost,” says Brian J. Bonnick, senior vice president of technology for IMAX Corporation.

Dell, Intel, and Linux take front-row seats at IMAX

IMAX evaluated proprietary UNIX®-based servers as well as several Intel® architecture platforms. “Our software was developed in-house, and ongoing support is critical. The IMAX DMR system is critical to our future business strategy and needs to remain 100 percent operational 24 hours a day,” Bonnick says. “We decided that a distributed render farm based on Intel Pentium® III processors was the right solution for this application.”

Once IMAX had selected the Intel architecture platform as its processor of choice, the company judged hardware vendors based on support quality, performance, availability, price, warranty, and consistency of components. These criteria led IMAX to Dell™ PowerEdge™ servers.

Dell provided IMAX with a range of evaluation systems for IMAX developers to conduct benchmark tests. “The ability to evaluate Dell computers during our initial testing process was very helpful,” Bonnick says. “After three months of testing in a real production environment, Dell PowerEdge 2550¹ servers proved to be quite reliable and led to our decision to choose Dell platforms as our render farm units.”

Dell support for the Linux® operating system was another appealing factor. Because most IMAX software is Linux- and UNIX-based—and because the IMAX DMR software performs best when running on Linux—IMAX selected Red Hat® Linux 7.2 as the render farm operating system.

After deciding what platform to use, IMAX finalized the details of the configuration. The render farm architecture comprises dozens of PowerEdge 2550 servers running Red Hat Linux and IMAX DMR rendering software. Each server uses two Intel Pentium III processors at 1.4 GHz with 512 KB level 2 (L2) cache and 4 GB RAM, and two 73 GB SCSI drives connected to 4 TB of RAID storage. Three Dell PowerConnect™ network switches connect all the servers to one another and to a bank of RAID storage. A third-party SGI® Origin® 2000 series UNIX server controls the server farm.

Dell technical advice and support helped streamline implementation of this architecture to just six weeks. “To successfully launch

a program of this complexity, a strong partnership between client and vendor is a must,” Bonnick says. “Dell supplying us with evaluation units was invaluable, as were the consultation and support.”



The project blasts off with *Apollo 13*

The Dell-Intel-Linux render farm cranked through terabytes of data each day for a record 10 weeks to remaster Academy Award® winner *Apollo 13* to 15/70 film format. *Apollo 13* was the first live-action Hollywood film remastered by IMAX DMR.

“IMAX DMR technology has the capacity to process substantially more data in a shorter period of time,” Bonnick says. “Dell PowerEdge servers give us tremendous price/performance advantages and also support scalability of our technology. This enables us to remaster an entire feature film in a short enough time to accommodate tight film release schedules.”

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Reliability gets rave reviews

To meet the exacting requirements of Hollywood deadlines for film releases, the IMAX DMR process must operate flawlessly. “Dell servers have been exceptionally reliable,” Bonnick says. “Every PowerEdge 2550 functioned flawlessly from start to finish during the entire production of *Apollo 13: The IMAX Experience*.”

The success of the distributed Dell-Intel-Linux architecture has led the company to deploy additional Dell-based systems for future applications. “IMAX will continue to use Dell as our major supplier of servers and switches,” Bonnick says. “We hope Dell continues to develop more of these powerful, high-volume, multiprocessor server solutions and high-performance storage solutions.”

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<http://www.dell.com>

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¹Newer models are available at <http://www.dell.com>.