



Intel® Software Development Products
for Intel Platforms and Technologies

Delivering Real-Time 3D Video Compositing

“The Intel® IPP [Intel Integrated Performance Primitives] is the fastest image processing library we've found, resulting in much greater interactivity and creative freedom for our users.”

Bruce Rady
President
RadTIME, Inc.

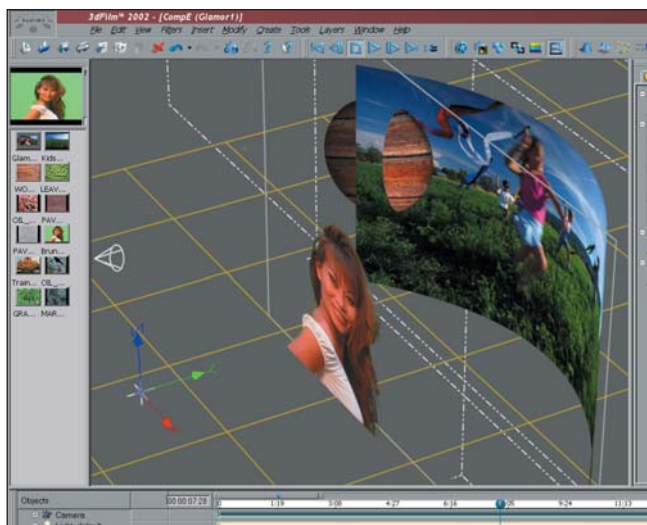
Creating special effects

Artists and developers want intuitive tools that enable and enhance the creative process of producing motion graphics. Creating special effects for film, video, games, and the Web takes a combination of imagination, an artistic eye, and graphics skill. Ideas develop fluidly at times, and in fits and starts at other times. Today's artists face the challenge of seamlessly combining video footage with 3D elements. They need to move easily from 2D to 3D models, then to video, and to ultimately combine them into realistic and appealing, finished, new media. As these artists create, they want to see their final result as quickly

as possible, with real-time screen-based animation, enabling them to tweak and reshape as they work. Until now, there hasn't been a single product that can fully support this complex process.

Enhancing performance

Chicago-based RadTIME develops intuitive tools to enhance the creative process of producing moving graphics. RadTIME software technology offers a radical improvement in video compositing and 3D modeling and animation.



Intel® Integrated Performance Primitives (Intel® IPP) is a cross-platform signal processing and multimedia software library with a low-level layer that abstracts functionality from the processor underneath. This allows applications to transparently use recent Intel architecture enhancements and optimizations for a broad range of Intel microprocessors, including Pentium® 4, Itanium® 2, and Intel® Xeon™ processors, as well as Intel® Personal Internet Client Architecture (Intel® PCA) application processors based on Intel XScale™ microarchitecture. With a single application programming interface (API) across the range of Intel processor-based platforms, multimedia application developers can achieve compatibility and reduce development costs.

THE APPLICATION Integrating 3D and video

Using the same graphics accelerator chips used in game design, and with code highly optimized for the Intel Pentium 4 processor, 3dFilm* allows users to view animation without waiting for rendering or caching. Artists can create or import 3D models directly onto the same timeline and in the same project file where media layers are composited.

THE CHALLENGE

Studio-quality playback on a PC

RadTIME wanted to make a digital content creation tool to take advantage of the latest platform features, including Pentium 4 and Itanium 2 processors and the Intel Xeon microarchitecture, to provide as close to real-time playback of animation and video as possible. While the core RadTIME rendering/compositing engine was extremely fast, streaming high-resolution video into it was a challenge. The engine had the capability of working at rates much faster than the hardware was delivering.

“The real benefit of Intel® IPP is that it lets us stream high-resolution video into our rendering engine, allowing it to play at speeds closer to real-time than our competition.”

Bruce Rady
President
RadTIME, Inc.

RadTIME sought to deliver a single tool that allowed artists to merge media files, graphics, 3D objects, filtering, and animation with equal flexibility and control. One key design strategy was to fully utilize the Intel Integrated Performance Primitives for much of the 2D math image processing functions.

3dFilm has a fast core compositing engine, capable of running 70 to 100 frames per second, even at National Television Standards Committee (NTSC) or higher resolutions. The human eye can discern video playback degradation when frame rates

fall much below 30 frames per second. However, if the PC streaming the video is limited to delivering 10 to 15 frames per second, viewers miss the excellent performance of the RadTIME compositing engine.

THE ANSWER

Real-time playback

To solve this, RadTIME fully integrated the Intel IPP library into 3dFilm software, and also took advantage of some highly-optimized MPEG-2 sample code that is available to all Intel IPP registered users. A critically important expectation from the Intel IPP was for the fast decoding of broadcast-studio quality MPEG-2 streams to enable real-time playback of video (30+ fps). Intel IPP met this expectation, and did so with better performance than other industry applications (see table). RadTIME engineers ran video through 3dFilm before and after the MPEG-2 decode module was integrated. Results show that overall video frame-rate rendering performance of the RadTIME application increased from 12 to 14 fps to 30 fps after optimizing with the Intel IPP.

Intel IPP also accelerated the application time-to-market delivery of the RadTIME application by 6 to 12 months—a huge win for the company.

THE ADVANTAGE

Integrated, accelerated 3D content creation tools

RadTIME, with the help of Intel IPP, makes it all possible—perhaps even causing a small revolution in the video industry. 3dFilm users can easily combine both 2D and 3D elements in one tool, eliminating many time-consuming rendering steps that sap creativity. The entire media creation process is streamlined for moving from concept to creation more quickly than ever before. This increases creativity while reducing time to market and production costs.

Playback Rates** of Sample Video Footage (in frames per second)

Video File	QuickTime* (Apple Component Video)	DirectShow* (MJPEG)	RadTIME MPEG-2 with Intel® IPP
“Trainstation”	14.4 fps	21.8 fps	30.0 fps
“Melrose”	11.9 fps	23.0 fps	30.0 fps
“Green screen scene”	NA	17.8 fps	30.0 fps

**Benchmark rates provided by RadTIME, Inc. Measurements were taken of scene animation frame rates in frames per second (fps) using three samples of video footage textured onto 3D objects in 3dFilm. All video files were 720 x 486 pixel resolution (720 x 480 for MPEG-2) and 30 fps. One set used Apple QuickTime* with the Video Component codec and another set used DirectShow* with an MJPEG video codec.

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