

NVIDIA GeForce FX 5900, 5700 and Go5700 GPUs: UltraShadow Technology

The new NVIDIA® GeForce™ FX 5900 , GeForce FX 5700 and GeForce FX Go5700 graphics processing units (GPUs) introduce NVIDIA® UltraShadow™ technology, accelerating the computations for determining shadow interactions within an immersive environment. By contributing to the next generation of complex effects, UltraShadow enables high-quality, cinematic realism for next-generation games like *Doom III*™ from id Software and *Abducted* from Contraband Entertainment.

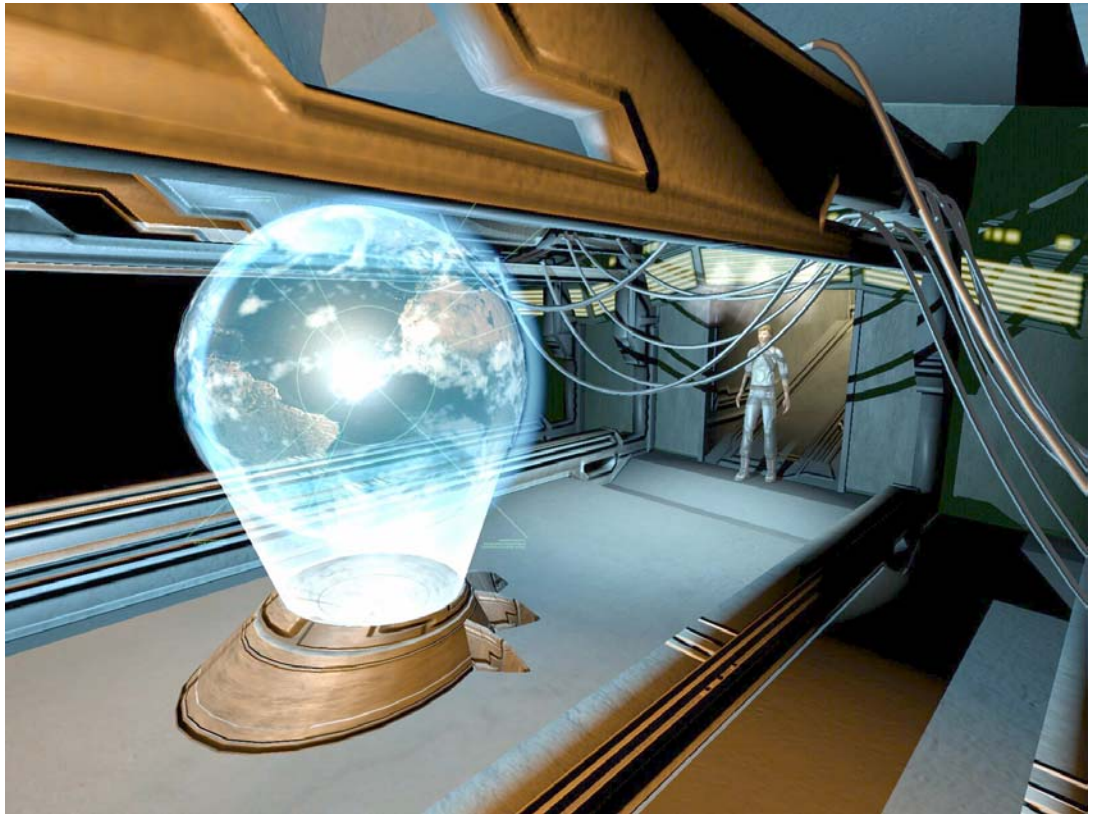


Figure 1. Today's leading edge games create complex light sources and realistic shadows, as illustrated in this scene from *Abducted*. Photo courtesy of Contraband Entertainment, © Contraband 2003.

Speeding Up Shadows

Accurate shadows are critical for realistic and believable scenes. The complex interactions between multiple light sources and numerous objects and characters involve multiple-pass programming. For every frame, every light source must be analyzed relative to every object. The patent-pending UltraShadow technology can be applied to today's games to introduce stunning visual effects that create distinctive looks and digital environments, that can set a game apart from the competition.

Software Advances

UltraShadow gives programmers the ability to calculate shadows much more quickly by eliminating unnecessary areas from consideration. With UltraShadow, programmers can define a bounded portion of the scene (often called depth bounds) that limits calculations of lighting source effects to objects within a specified area. (See Figure 2.) By limiting calculations to the area most affected by a light source, the overall shadow generation process can be greatly accelerated. Programmers can fine-tune shadows within critical regions, create incredible visualizations that effectively mimic reality, and still achieve awesome performance for fast-action games. The accelerated shadow generation can also free up time that can be allocated to other sophisticated but time-consuming effects.

Hardware Advances

Because stenciled shadow volumes require no texturing or color updates, the hardware “doubles up” the rendering horsepower to generate stenciled shadow volumes at speeds of up to double the standard pixel-processing rate. Other graphics solutions have to render stenciled shadow volumes in two passes. The GeForce FX GPUs accomplish the shadow volume rendering in a single pass, reducing CPU overhead and improving GPU performance. UltraShadow increases this performance by actually “culling” shadow pixels. UltraShadow allows the hardware to ignore shadow pixels that will not contribute to the final image. The NVIDIA approach also interoperates with NVIDIA Intellisample™ high-resolution compression technology (HCT) to make sure that shadow edges are properly antialiased. The GeForce FX 5900, 5700 and Go5700 GPUs maintain the stencil information on a sub-pixel basis, ensuring that shadow edges are antialiased rather than “blocky” or “jaggy.”

Applications

Anytime a game or application calculates shadows, UltraShadow will enhance the application performance. The more passes that are required for the lighting and shadow calculations—for example, scenes that involve multiple light sources and many physical objects in sight—the more significant the performance improvement, with the most complex scenes achieving the most noticeable results.

Emerging next-generation games, such as *Doom III* and *Abducted*, will see dramatic improvements in execution speeds. The GeForce FX 5900, GeForce FX 5700 and



GeForce FX Go5700 GPUs with UltraShadow technology continue to enable a new generation of gaming effects.

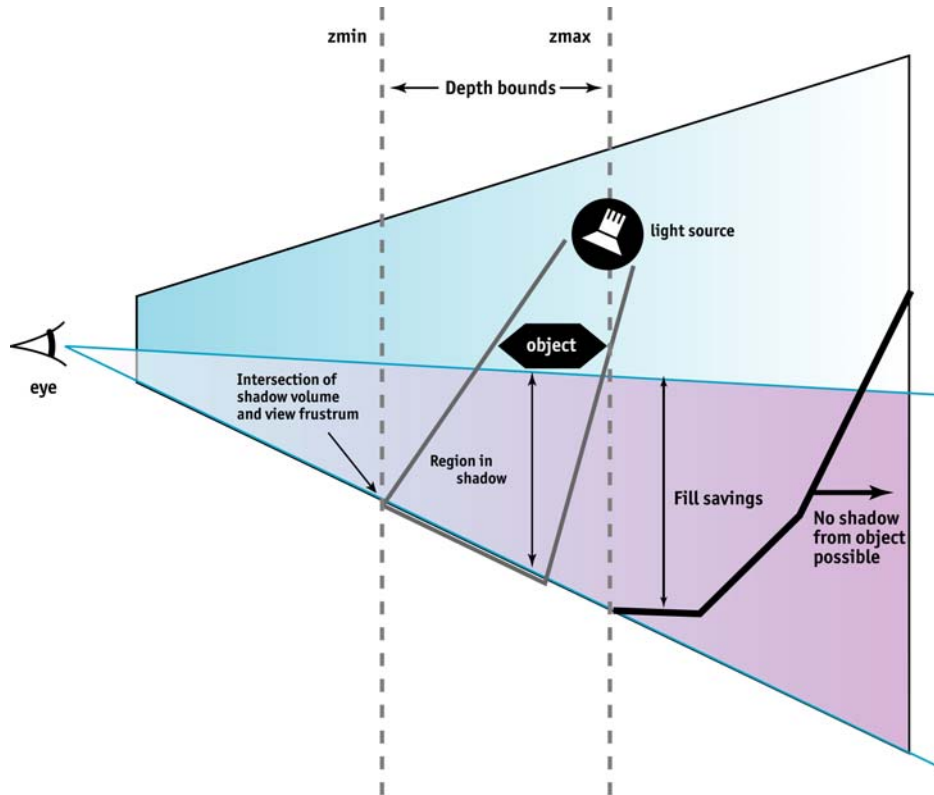


Figure 2. Programmers can define a subset of the scene (within z_{min} and z_{max}) to limit lighting/shadow calculations to the appropriate area for each light source.

Summary

The introduction of the GeForce FX 5900, GeForce FX 5700 and GeForce FX Go5700 GPUs represents a major leap forward in real-time cinematic effects. Delivering innovative technologies like UltraShadow, the GeForce FX GPUs power the complex effects in today's leading-edge games.

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