

GPUTrace

Accelerate LucidShape Light Simulations



Introduction

The heart of every computer is the Central Processing Unit (CPU). All computer operations are handled by this little chip. The faster the CPU, the faster the programs will run. A CPU thread is limited to one operation at a time or, if the CPU has multiple threads, times n .

LucidShape already takes advantage of multiple CPU cores by efficient multithreading, but why not use additional graphics power?

Graphics Processing Units

Every modern graphics card has a Graphics Processing Unit (GPU) on board that can have thousands of small processors that are optimized to do geometrical calculations. LucidShape's GPUTrace technology uses those processors to accelerate optical simulations.

What is very promising about current GPU technology is that during the last few years, GPUs have gained calculation power much faster than CPUs (see Figure 2).

Significant Performance Improvements

We benchmarked real-life models with our multithreaded simulation method, using multi-core CPUs. Then we compared it with NVIDIA graphics card on the same machine.

Using GPUTrace, we experienced a reduction in simulation time by a factor of up to 30, compared to the multicore simulation. That means the GPU simulation can be 30 times faster than a CPU simulation. If your simulation speed is that fast, you can spend more time improving your designs, rather than waiting for simulations. Demanding applications, such as ray tracing light pipes, can greatly benefit from this simulation acceleration.

Hardware Requirements

All you need for GPUTrace is a modern NVIDIA graphics card. Different models with different speeds and prices are available — we are happy to assist with your selection. You can achieve fast results with low-cost hardware.

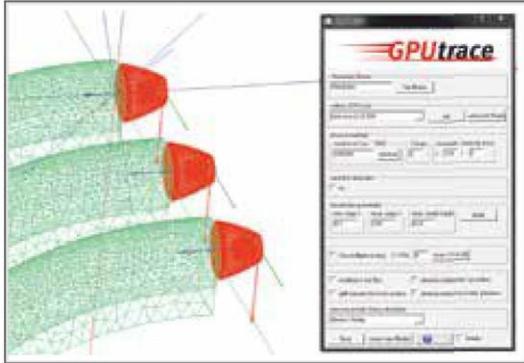


Figure 1. GPUTrace performing simulation on light pipes

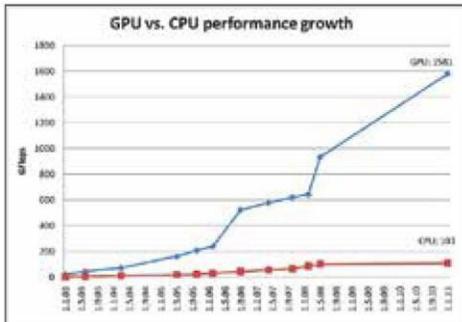


Figure 2. Data based on Havok FX Physics on NVIDIA GPUs

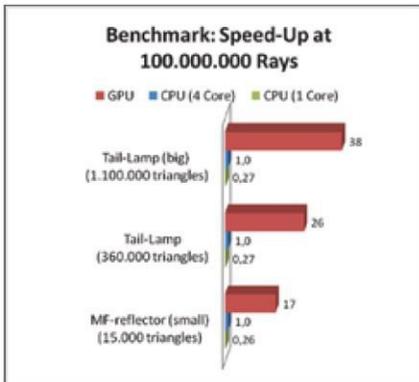


Figure 3. Benchmark results GPU vs. CPU

Summary

LucidShape is the first optical simulation software to take advantage of cutting-edge GPU technology. The speed increase is significant (up to x30). Future improvements to graphics cards promise even greater performance increases.

For more information, please visit the [LucidShape](#) page or contact us at keysight.com/find/email-support.

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