

## Overview

The heart of every computer is the Central Processing Unit (CPU). Many computer operations are handled by this little chip. The faster the CPU, the faster the programs will run. Because of technical restrictions, the CPU is limited to make only a few calculations at a time. If your application supports multithreading, this number of calculations can be multiplied by the number of internal cores in your computer.

LucidShape already takes advantage of multiple CPU cores by multithreading technology, but you can greatly increase efficiency by harnessing the power of graphics cards.

## Graphics Processing Units

Every modern graphics card has one or multiple Graphics Processing Units (GPUs) that contain thousands of small processors that are optimized to do geometrical calculations at the same time. LucidShape's GPUTrace technology takes advantage of this to accelerate optical simulations by a huge factor.

What is very promising about current GPU technology is that over the last few years GPUs have gained calculation power much faster than CPUs as you can see in the figure to the left.

## Significant Performance Improvements

We benchmarked real-life models with our multithreading simulation method, using one of the fastest Intel multi-core CPU available. Then we compared it with a powerful NVIDIA graphics card on the same machine.

Using GPUTrace we experienced a reduction in simulation time by a factor of up to 36, compared to the multicore simulation. That means the GPU simulation can be 36 times faster than a CPU simulation. If your simulation speed is that fast, you can spend more time improving your illumination designs rather than waiting for simulations. Demanding applications — such as ray tracing light pipes or photorealistic simulations — can greatly benefit from this simulation acceleration.

## Hardware Requirements

All you need for GPUTrace is a recent NVIDIA graphics card. Different models with different speeds and prices are available— we are happy to assist with your selection.

## Summary

LucidShape is the optical simulation software that takes advantage of cutting-edge GPU technology. The speed increase is significant (up to x36). Future improvements to graphics cards promise even greater performance increases.