GPU Gems 3

By Hubert Nguyen

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> "The GPU Gems series features a collection of the most essential algorithms required by Next-Generation 3D Engines."
> —**Martin Mittring, Lead Graphics Programmer, Crytek**

This third volume of the best-selling GPU Gems series provides a snapshot of today's latest Graphics Processing Unit (GPU) programming techniques. The programmability of modern GPUs allows developers to not only distinguish themselves from one another but also to use this awesome processing power for non-graphics applications, such as physics simulation, financial analysis, and even virus detection—particularly with the CUDA architecture. Graphics remains the leading application for GPUs, and readers will find that the latest algorithms create ultra-realistic characters, better lighting, and post-rendering compositing effects.

Major topics include

- Geometry
- Light and Shadows
- Rendering
- Image Effects
- Physics Simulation
- GPU Computing

Contributors are from the following corporations and universities:

3Dfacto
Adobe Systems
Apple
Budapest University of Technology and Economics
CGGVeritas
The Chinese University of Hong Kong
Cornell University
Crytek
Czech Technical University in Prague
Dartmouth College
Digital Illusions Creative Entertainment

Eindhoven University of Technology
Electronic Arts
Havok
Helsinki University of Technology
Imperial College London
Infinity Ward
Juniper Networks
LaBRI–INRIA, University of Bordeaux
mental images
Microsoft Research
Move Interactive
NCsoft Corporation
NVIDIA Corporation
Perpetual Entertainment
Playlogic Game Factory
Polytime
Rainbow Studios
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University of North Carolina Chapel Hill
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Section Editors include NVIDIA engineers: Cyril Zeller, Evan Hart, Ignacio Castaño, Kevin Bjorke, Kevin Myers, and Nolan Goodnight.

The accompanying DVD includes complementary examples and sample programs.

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Editorial Review

About the Author

Hubert Nguyen, Manager of Developer Education at NVIDIA, is a graphics engineer who worked in the NVIDIA Demo Team before moving to his current position. His work is featured on the covers of *GPU Gems* (Addison-Wesley, 2004) and *GPU Gems 2* (Addison-Wesley, 2006).

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It has been only three years since the first GPU Gems book was introduced, and some areas of real-time graphics have truly become ultrarealistic. Chapter 14, "Advanced Techniques for Realistic Real-Time Skin Rendering," illustrates this evolution beautifully, describing a skin rendering technique that works so well that the data acquisition and animation will become the most challenging problem in rendering human characters for the next couple of years.

All this progress has been fueled by a sustained rhythm of GPU innovation. These processing units continue to become faster and more flexible in their use. Today's GPUs can process enormous amounts of data and are used not only for rendering 3D scenes, but also for processing images or performing massively parallel computing, such as financial statistics or terrain analysis for finding new oil fields.

Whether they are used for computing or graphics, GPUs need a software interface to drive them, and we are in the midst of an important transition. The new generation of APIs brings additional orthogonality and exposes new capabilities such as generating geometry programmatically. On the computing side, the CUDA architecture lets developers use a C-like language to perform computing tasks rather than forcing the programmer to use the graphics pipeline. This architecture will allow developers without a graphics background to tap into the immense potential of the GPU.

More than 200 chapters were submitted by the GPU programming community, covering a large spectrum of GPU usage ranging from pure 3D rendering to nongraphics applications. Each of them went through a rigorous review process conducted both by NVIDIA's engineers and by external reviewers.

We were able to include 41 chapters, each of which went through another review, during which feedback from the editors and peer reviewers often significantly improved the content. Unfortunately, we could not include some excellent chapters, simply due to the space restriction of the book. It was difficult to establish the final table of contents, but we would like to thank everyone who sent a submission.

Intended Audience

For the graphics-related chapters, we expect the reader to be familiar with the fundamentals of computer graphics including graphics APIs such as DirectX and OpenGL, as well as their associated high-level programming languages, namely HLSL, GLSL, or Cg. Anyone working with interactive 3D applications will find in this book a wealth of applicable techniques for today's and tomorrow's GPUs.

Readers interested in computing and CUDA will find it best to know parallel computing concepts. C programming knowledge is also expected.

Trying the Code Samples

GPU Gems 3 comes with a disc that includes samples, movies, and other demonstrations of the techniques described in this book. You can also go to the book's Web page to find the latest updates and supplemental materials: developer.nvidia.com/gpugems3.

Users Review

From reader reviews:

Bessie Barrett:

This book untitled GPU Gems 3 to be one of several books that will best seller in this year, that is because when you read this book you can get a lot of benefit upon it. You will easily to buy this specific book in the book store or you can order it via online. The publisher of the book sells the e-book too. It makes you easier to read this book, because you can read this book in your Cell phone. So there is no reason to you to past this e-book from your list.

Lorenzo Davis:

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Jacqueline Thompson:

Reading can called thoughts hangout, why? Because when you are reading a book mainly book entitled GPU Gems 3 your head will drift away trough every dimension, wandering in each aspect that maybe unfamiliar for but surely can be your mind friends. Imaging each and every word written in a book then become one web form conclusion and explanation which maybe you never get ahead of. The GPU Gems 3 giving you an additional experience more than blown away your mind but also giving you useful info for your better life within this era. So now let us teach you the relaxing pattern this is your body and mind will likely be pleased when you are finished examining it, like winning a game. Do you want to try this extraordinary spending spare time activity?

Carla Helton:

Many people spending their time period by playing outside having friends, fun activity with family or just watching TV all day every day. You can have new activity to shell out your whole day by reading through a book. Ugh, do you think reading a book can really hard because you have to accept the book everywhere? It okay you can have the e-book, taking everywhere you want in your Smart phone. Like GPU Gems 3 which is

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