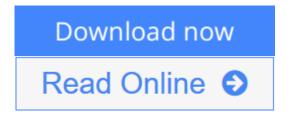# Multithreading for Visual Effects

By Martin Watt, James Reinders

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Tackle the Challenges of Parallel Programming in the Visual Effects Industry

In **Multithreading for Visual Effects**, developers from DreamWorks Animation, Pixar, Side Effects, Intel, and AMD share their successes and failures in the messy real-world application area of production software. They provide practical advice on multithreading techniques and visual effects used in popular visual effects libraries (such as Bullet, OpenVDB, and OpenSubdiv), one of the industry's leading visual effects packages (Houdini), and proprietary animation systems. This information is valuable not just to those in the visual effects arena, but also to developers of high performance software looking to increase performance of their code.

Diverse Solutions to Solve Performance Problems

After an introductory chapter, each subsequent chapter presents a case study that illustrates how the authors used multithreading techniques to achieve better performance. The authors discuss the problems that occurred and explain how they solved them. The case studies encompass solutions for shaving milliseconds, solutions for optimizing longer running tasks, multithreading techniques for modern CPU architectures, and massive parallelism using GPUs. Some of the case studies include open source projects so you can try out these techniques for yourself and see how well they work.

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Editorial Review

Review

"Multithreading applications is hard, but for today's performance-critical codes, an absolute necessity. This book shows how the latest parallel programming technology can simplify the daunting challenge of producing fast and reliable software for multicore processors. Although the instructive case studies are drawn from visual effects applications, the authors cover the gamut of issues that developers face when parallelizing legacy applications from any domain."
?Charles Leiserson, MIT Computer Science and Artificial Intelligence Laboratory

"Multithreading graphics algorithms is a new and exciting area of research. It is crucial to computer graphics. This book will prove invaluable to researchers and practitioners alike. It will have a strong impact on movie visual effects and games."
?Jos Stam, Senior Principal Research Scientist, Autodesk, Inc.

"Visual effects programming is undergoing a renaissance as high-end videogame effects technology approaches the state-of-the-art defined by blockbuster Hollywood movies, empowered by the capabilities of multi-Teraflop GPU hardware. A wealth of graphics algorithms are now graduating into the realm of real-time rendering, yet today's programmers face a formidable challenge in structuring these algorithms to take full advantage of today's multi-core CPU architectures and deliver on their potential.
This book, the collaborative result of many industry luminaries, wonderfully bridges the gap between the theory of multithreading and the practice of multithreading in advanced graphical applications. Join them on this journey to bring real-time visual effects technology to the next level!"
?Tim Sweeney, CEO and Founder of Epic Games

"…valuable not just to those in the visual effects arena, but also to developers of high performance software looking to increase performance of their code."
?Scott R. Garrigus, *NewTechReview*

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Linda Matthews:

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