High-Performance Graphics 2010

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Preface

We are pleased to present the proceedings of High-Performance Graphics 2010. This is the second year after the highly successful merger of two previous, successful conferences, Graphics Hardware and Interactive Ray Tracing. Graphics Hardware was an annual conference since 1986 focusing on graphics hardware, architecture, and systems, and Interactive Ray Tracing was a symposium established in 2006 focusing on the emerging field of interactive ray tracing and global illumination techniques.

The goal of combining these two conferences was to bring to authors and attendees the best of both, while extending the scope of the new conference to cover the overarching field of performance-oriented graphics systems covering innovative algorithms, efficient implementations, and hardware architecture. This broader focus offers a common forum bringing together researchers, engineers, and architects to discuss the complex interactions of massively-parallel hardware, novel programming models, efficient graphics algorithms, and innovative applications. One of the motivations of the merger was to further the coming together of ray tracing and graphics hardware. Judging from the submissions and the selected papers, this trend is going forward strongly, and real-time ray tracing is becoming more feasible all the time. This year we can also see a renewed interest in rasterization and micropolygon-based rendering as well as effects such as motion blur and depth of field. These have been traditionally associated with offline rendering, but are steadily approaching real-time usage due to advances in hardware and algorithms. These are exciting times to be in graphics research.

In previous years, GH typically received around 25 paper submissions and IRT received around 40. We were delighted to receive 60 submissions to HPG this year, slightly down from last year's 72. The submission pool continues to be strong, reflecting the level of activity and high quality research work in this area. The influence of the conference's origins remains strong, but HPG is already finding its own personality, and there seems to be a collective consensus of the nature of the conference. This was reflected in the submissions, whose topics were almost universally suitable for the conference.

We continued to have a large papers committee with 61 members. This helped with the exceptionally tight schedule due to this being an European year for HPG. We also had an abstract submission and bidding phase for the first time this year. These allowed the committee to pick papers that best suited their backgrounds and interests, substantially improving the assignment process. All reviewers worked hard to create detailed reviews and contribute to the discussion phase. We greatly appreciated these efforts.

We based our decisions on the reviews, the reviewer discussion, and the scores, but in following the GH tradition, the final decisions were made by the three of us. We ultimately selected 19 of the 60 papers, yielding a competitive acceptance rate of 32%. Looking at the submissions and the accepted papers, we feel that the quality of the papers is high, and HPG continues to be a strong conference that is respected by the community. We look forward to its continuation in the years ahead.

Michael Doggett
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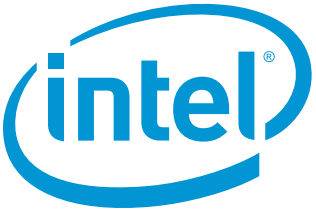

Keynote

Disaggregated Graphics: Rich Clients for Clouds

Turner Whitted
Microsoft Research

Abstract
We sometimes forget that the famous "wheel of reincarnation"' translates as it rotates, transporting us to unfamiliar technological territory even if we recognize historical similarities. So it is with the emergence of cloud computing with its concentrated computation and wide bandwidth interconnection. It is not, however, a return to the mainframe computer centers of the 1960s or the client/server model of the 1980s. Instead we are offered more computation, more pixels, more modes of interaction, ... more of everything. We are given so much more that the change of experience is qualitative, not merely quantitative.

Microsoft Research's vX project is an experiment devised to explore the client side of this new computing environment. Radically rich visual computing calls for radically new architectures, programming models, and approaches to interaction. We are re-examining these venues simultaneously rather than independently. At the highest level, the vX model insists on interaction being local even if it is shared among a heterogeneous collection of devices. At a lower level, the vX programming model emphasizes local memory access within each of many processing cores. This philosophy extends to the lowest level of the graphics engine with memory intensive passive representations being replaced with processor intensive functional representations.

As we progress with this project we find our alignment with technological trends for processing and interconnection takes us far from conventional graphics practice. This should be no surprise. It is time for change.

Turner Whitted's Biography
As a researcher and former manager at Microsoft Research, Turner Whitted has explored topics in hardware devices, HCI, and computer graphics. He was a member of the computer science faculty at the University of North Carolina at Chapel Hill from 1983 until 2001 as well as a cofounder and director of Numerical Design Limited. Prior to that he was a member of the technical staff in Bell Labs' computer systems research laboratory where he introduced the notion of using recursive ray tracing to implement global illumination. He earned BSE and MS degrees from Duke University and a PhD from North Carolina State University, all in electrical engineering. In the past he has served on the editorial boards of IEEE Computer Graphics and Applications and ACM Transactions on Graphics, and was papers chair for SIGGRAPH 97. He is an ACM Fellow and a member of the National Academy of Engineering.

Keynote

Crytek's Future Game Graphics

Cevat Yerli & Anton Kaplanyan
Crytek

Abstract
We want to share our ten-year expertise of making a generalized and balanced real-time rendering pipeline on consoles. Different algorithms for image synthesis will be discussed as well as different architectures for different workloads. The problems of the current rendering pipeline and the current generation of consoles will be discussed. Also we will talk about the new possible applications for real-time graphics such as movies industry and server-side rendering.

Cevat Yerli's Biography
President & CEO of Crytek. Cevat's first games and development experiences go back to the 1980s with the Commodore 64 and the Schneider CPC 6128, where he worked on simulation games. His passion has always been creating and playing games. While studying economics, he began working towards his dream of founding a game development company. The dream became reality in 1999 when he founded Crytek with his two brothers. Cevat gives creative direction for all Crytek products.

Anton Kaplanyan's Biography
Anton Kaplanyan is a Lead Researcher at Crytek. During the development of CryEngine 3 he was responsible for multiple researches on graphics and porting of CryEngine 2 to the current generation of consoles. Currently he is busy working on the next iteration of the engine to keep pushing both DX11 and next-gen console technology. Additionally he is working on his PhD within Stuttgart University. Prior to joining Crytek he received his M.S. in Computer Science at Moscow University of Electronic Engineering, Russia in early 2007.

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