GPU Computing: Programming a Massively Parallel Processor

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Many researchers have observed that general purpose computing with programmable graphics hardware (GPUs) has shown promise to solve many of the world's compute intensive problems, many orders of magnitude faster the conventional CPUs. The challenge has been working within the constraints of a graphics programming environment and limited language support to leverage this huge performance potential. GPU computing with CUDA is a new approach to computing where hundreds of on-chip processor cores simultaneously communicate and cooperate to solve complex computing problems, transforming the GPU into a massively parallel processor. The NVIDIA C-compiler for the GPU provides a complete development environment that gives developers the tools they need to solve new problems in computation-intensive applications such as product design, data analysis, technical computing, and game physics. In this talk, I will provide a description of how CUDA can solve compute intensive problems and highlight the challenges when compiling parallel programs for GPUs including the differences between graphics shaders vs. CUDA applications.

Ian Buck is the software manager of the GPU-Compute effort at NVIDIA which includes the CUDA software development kit. Dr. Buck received his Ph.D. in Computer Science from Stanford University where his thesis work, titled "Stream Computing on Graphics Hardware," researched programming models and computing strategies for using graphics hardware as a general purpose computing platform. His work included developing the Brook programming platform for abstracting the GPU as a general purpose streaming coprocessor. He has written multiple articles on the topics of GPGPU and GPU Computing as well as contributed to tutorials and workshops at SIGGRAPH, Supercomputing, and IEEE Visualization on the topic of GPGPU. Dr. Buck holds a BSE degree from Princeton University.

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