

Preface

Graphics Processing Unit (GPU) technology is playing an important role in computing today. This book presents a collection of state-of-the-art research on GPU computing and their applications. The major part of this book is selected from the work submitted to the 2013 Symposium on GPU Computing and Applications jointly organized by the Institute for Media Innovation of Nanyang Technological University, and NVIDIA Corporation (South East Asia).

The book addresses the fundamental issues in GPU computing with a focus on big data processing. Three major domains of GPU applications are covered in the book including (1) Engineering design and simulation; (2) Biomedical Sciences; and (3) Interactive & Digital Media.

This book has 17 chapters. Each chapter is carefully selected to present ideas and techniques with insight in a specific area. In Chap. 1, Panpan Cai et al. will report a GPU-enabled parallel genetic algorithm for path planning. In Chap. 2, Alexandre Kaspar and Bailin Deng will introduce real-time deformation of constrained meshes using GPU. In Chap. 3, Yanlin Luo et al. will investigate GPU-based real-time volume interaction for scientific visualization education. In Chap. 4, Petros Papanikolaou and George Papagiannakis will illustrate real-time separable sub-surface scattering for animated virtual characters. In Chap. 5, Yusha Li et al. will describe adaptive NURBS tessellation on GPU. In Chap. 6, Huagen Wan et al. will discuss a graphics native approach to identifying surface atoms of macromolecules. In Chap. 7, Farhoosh Alghabi et al. will explain their scalable software framework for stateful stream data processing on multiple GPUs. In Chap. 8, Tananan Pattanangkur et al. will share their solution for high performance mobile medical imaging. In Chap. 9, David Mainzer and Gabriel Zachmann will showcase their collision detection based on fuzzy scene subdivision. In Chap. 10, Philip Boyer et al. will present the smoothed particle hydrodynamics applied to cartilage deformation. In Chap. 11, Kyrlo Shegeda and Pierre Boulanger will describe a GPU-based real-time algorithm for virtual viewpoint rendering from multi-video. In Chap. 12, Ettikan K. Karuppiyah et al. will illustrate a middleware framework for programmable multi-GPU based big data applications. In Chap. 13, Byungjoon Chang et al. will talk on the efficient implementation of a real-time Kd-tree

construction algorithm. In Chap. 14, [Niko Lukac](#) and [Borut Zalik](#) will discuss fast approximate k-nearest neighbors search using GPGPU. In Chap. 15, Shafaatunnur Hasan et al. will share their soft computing methods for big data problems. In Chap. 16, Martin Němec and Lumír Janošek will show a numerical solution of BVP on GPU with application to path-planning. And in Chap. 17, Amirul Abdullah et al. will investigate fast multi-keyword range search in GPGPU.

Readers will benefit from this book which is contributed by experienced GPU researchers and educators. The book may also motivate researchers and developers to develop new possible applications of GPU technology in various areas.

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