Contents

Best Paper

Hands on with OpenMP4.5 and Unified Memory: Developing Applications for IBM’s Hybrid CPU + GPU Systems (Part I) ......................... 3
Leopold Grinberg, Carlo Bertolli, and Riyaz Haque

Hands on with OpenMP4.5 and Unified Memory: Developing Applications for IBM’s Hybrid CPU + GPU Systems (Part II) ..................... 17
Leopold Grinberg, Carlo Bertolli, and Riyaz Haque

Advanced Implementations and Extensions

Leveraging OpenMP 4.5 Support in CLANG for Fortran ...................... 33
Hyojin Sung, Tong Chen, Zehra Sura, and Tarique Islam

Compiling and Optimizing OpenMP 4.X Programs to OpenCL and SPIR . . . 48
Marcio M. Pereira, Rafael C.F. Sousa, and Guido Araujo

Extending OpenMP SIMD Support for Target Specific Code and Application to ARM SVE ......................................................... 62
Jinpil Lee, Francesco Petrogalli, Graham Hunter, and Mitsuhisa Sato

OpenMP Application Studies

OpenMP Tasking and MPI in a Lattice QCD Benchmark ....................... 77
Larry Meadows and Ken-ichi Ishikawa

On the Performance of Parallel Tasking Runtimes for an Irregular Fast Multipole Method Application ............................................. 92
Patrick Atkinson and Simon McIntosh-Smith

Porting VASP from MPI to MPI+OpenMP [SIMD]: Optimization Strategies, Insights and Feature Proposals ................................. 107
Florian Wende, Martijn Marsman, Zhengji Zhao, and Jeongnim Kim

OpenMP* SIMD Vectorization and Threading of the Elmer Finite Element Software .................................................. 123
Mikko Byckling, Juhani Kataja, Michael Klemm, and Thomas Zwinger
## Analyzing and Extending Tasking

### Extending OMPT to Support Grain Graphs
- **Peder Voldnes Langdal, Magnus Jahre, and Ananya Muddukrishna**
  - Page 141

### Patterns for OpenMP Task Data Dependency Overhead Measurements
- **Joseph Schuchart, Mathias Nachtmann, and José Gracia**
  - Page 156

### Adaptive and Architecture-Independent Task Granularity for Recursive Applications
- **Antoni Navarro, Sergi Mateo, Josep Maria Perez, Vicenç Beltran, and Eduard Ayguadé**
  - Page 169

## OpenMP 4 Application Evaluation

### The Productivity, Portability and Performance of OpenMP 4.5 for Scientific Applications Targeting Intel CPUs, IBM CPUs, and NVIDIA GPUs
- **Matt Martineau and Simon McIntosh-Smith**
  - Page 185

## Extended Parallelism Models

### User Co-scheduling for MPI+OpenMP Applications Using OpenMP Semantics
- **Antoine Capra, Patrick Carribault, Jean-Baptiste Besnard, Allen D. Malony, Marc Pétrach, and Julien Jaeger**
  - Page 203

### Asynchronous OpenMP Tasking with Easy Thread Context Switching and Pool Control
- **Xing Fan, Oliver Sinnen, and Nasser Giacaman**
  - Page 217

### A Functional Safety OpenMP* for Critical Real-Time Embedded Systems
- **Sara Royuela, Alejandro Duran, Maria A. Serrano, Eduardo Quiñones, and Xavier Martorell**
  - Page 231

## Performance Analysis and Tools

### OpenMP Tools Interface: Synchronization Information for Data Race Detection
- **Joachim Protze, Jonas Hahnfeld, Dong H. Ahn, Martin Schulz, and Matthias S. Müller**
  - Page 249

### Accurate and Complete Hardware Profiling for OpenMP: Multiplexing Hardware Events Across Executions
- **Richard Neill, Andi Drebes, and Antoniu Pop**
  - Page 266
OpenMP® Runtime Instrumentation for Optimization. .......................... 281
   Taru Doodi, Jonathan Peyton, Jim Cownie, Maria Garzaran,  
   Rubasri Kalidas, Jeongnim Kim, Amrita Mathuriya, Terry Wilmarth,  
   and Gengbin Zheng

Assessing the Performance of OpenMP Programs on the Knights  
Landing Architecture .......................................................... 296  
   Dirk Schmidl, Bo Wang, and Matthias S. Müller

Advanced Data Management with OpenMP

Double Buffering for MCDRAM on Second Generation Intel® Xeon Phi™  
Processors with OpenMP ...................................................... 311  
   Stephen L. Olivier, Simon D. Hammond, and Alejandro Duran

A Pattern for Overlapping Communication and Computation with  
OpenMP® Target Directives .............................................. 325  
   Jonas Hahnfeld, Tim Cramer, Michael Klemm, Christian Terboven,  
   and Matthias S. Müller

Custom Data Mapping for Composable Data Management ............... 338  
   Tom Scogland, Chris Earl, and Bronis de Supinski

Author Index ................................................................. 349
Scaling OpenMP for Exascale Performance and Portability
13th International Workshop on OpenMP, IWOMP 2017, Stony Brook, NY, USA, September 20–22, 2017, Proceedings
de Supinski, B.R.; Olivier, S.L.; Terboven, C.; Chapman, B.M.; Müller, M.S. (Eds.)
2017, XI, 350 p. 116 illus., Softcover
ISBN: 978-3-319-65577-2