

Jungwon Kim

Curriculum Vitae

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Research Interests

High-performance computing, compilers, runtime systems, and programming models.

Appointments

2016– **Computer Scientist**, *Future Technologies Group*, Computer Science and Mathematics Division, Oak Ridge National Laboratory.

2014–2016 **Postdoctoral Research Associate**, Oak Ridge National Laboratory.

Education

2006–2013 **Ph.D. in Computer Science**, *Seoul National University*, Seoul, Korea, *supervised by Prof. Jaejin Lee*.

Thesis: An OpenCL Framework for Heterogeneous Clusters

1998–2006 **B.S. in Computer Science and Engineering**, *Seoul National University*, Seoul, Korea.

Industry Experience

2003–2005 **Software Engineer**, *Naver Corporation*, Seoul, Korea.

Developed a middleware for communication between the main database and the customer service center.

- Java, Oracle

2002–2003 **Software Engineer**, *NCubic*, Seoul, Korea.

Developed web applications.

- Java, JSP, IBM WebSphere, Oracle

2000–2002 **Software Engineer**, *Jinisoft (Startup)*, Seoul, Korea.

Developed a Java virtual desktop environment and user applications such as telnet client, email client, MSN-compatible messenger, MP3 player, bulletin board, remote file explorer, and etc.

- Java

Research Experience

2016– **Exascale Computing Project**, *Oak Ridge National Laboratory*.

Design and implement programming toolchains for emerging architectures and systems.

- IPDPS 2017, AsHES 2017
- C++, OpenCL, CUDA, MPI, OpenMP, OpenACC, LLVM Clang, ORNL Summitdev, NERSC Cori, TACC Stampede, UTK Beacon, NVIDIA GPU, KNC, KNL, Altera FPGA, NVM

- 2014–2016 **X-Stack Software Research**, *Oak Ridge National Laboratory*.
 Design and implement an OpenACC-based unified programming model for heterogeneous accelerator cluster, a tightly-integrated MPI+OpenACC framework, and an OpenACC framework for Altera FPGAs.
- HPDC 2016, IPDPS 2016
 - C++, OpenCL, CUDA, MPI, OpenMP, OpenACC, LLVM Clang, ORNL Titan, ANL Mira, ANL Cooley, NERSC Cori Phase I, UTK Beacon, NVIDIA GPU, AMD GPU, Intel Xeon Phi, Altera FPGA
- 2011–2016 **SnuCL: An OpenCL Framework for Heterogeneous Clusters**, *Seoul National University*.
 SnuCL extends the platform model of OpenCL to distributed heterogeneous systems.
- PLDI 2016, ICS 2012, PACT 2011, LCPC 2011, US Patent 9485303B2, US Patent 9396033B2
 - C++, OpenCL, MPI, LLVM Clang, NVIDIA GPU, AMD GPU
 - Open source (<http://snucl.snu.ac.kr/>), Khronos OpenCL Resources, AMD Developer Central.
- 2011 **GPU Virtualization**, *Seoul National University*.
 Developed an OpenCL framework that provides a single virtual GPU image to the user for the multiple GPUs available in the system.
- PPOPP 2011
 - C, C++, OpenCL, CUDA, LLVM Clang, NVIDIA GPU
- 2009–2010 **SNU-SAMSUNG OpenCL Framework**, *Seoul National University*.
 Designed and implemented the runtime of SNU-SAMSUNG OpenCL framework targeting Cell-BE.
- PACT 2010
 - C, OpenCL, IBM Cell-BE
 - Open source (<http://aces.snu.ac.kr/>), Khronos Conformant Products (Samsung Electronics 2010-02-03 OpenCL_1_0)
- 2008 **DVFS Techniques for QoP in Mobile Devices**, *Seoul National University*.
 Develop a dynamic voltage and frequency scaling technique for mobile devices that guarantees user satisfaction for multimedia applications.
- US Patent 8395701B2
 - C, Java, Intel PXA255

Publications

Conferences

- IPDPS 2017 Jungwon Kim, Kittisak Sajjapongse, Seyong Lee, and Jeffrey S. Vetter. “Design and Implementation of Papyrus: Parallel Aggregate Persistent Storage”. *In Proceedings of the 31st IEEE International Parallel and Distributed Processing Symposium*, pages 1151-1162, Orlando, Florida, USA, May 2017. Acceptance Rate: 22%
- PLDI 2016 Junghyun Kim, Gangwon Jo, Jaehoon Jung, Jungwon Kim, and Jaejin Lee. “A Distributed OpenCL Framework using Redundant Computation and Data Replication”. *In Proceedings of the 37th ACM SIGPLAN conference on Programming Language Design and Implementation*, pages 553-569, Santa Barbara, California, USA, June 2016. Acceptance Rate: 16%
- HPDC 2016 Jungwon Kim, Seyong Lee, and Jeffrey S. Vetter. “IMPACC: A Tightly Integrated MPI+OpenACC Framework Exploiting Shared Memory Parallelism”. *In Proceedings of the 25th ACM International Symposium on High-Performance Parallel and Distributed Computing*, pages 189-201, Kyoto, Japan, May 2016. Acceptance Rate: 15%

- IPDPS 2016 Seyong Lee, Jungwon Kim, and Jeffrey S. Vetter. “OpenACC to FPGA: A Framework for Directive-based High-Performance Reconfigurable Computing”. *In Proceedings of the 30th IEEE International Parallel and Distributed Processing Symposium*, pages 544-554, Chicago, Illinois, USA, May 2016. Acceptance Rate: 23%
- ICS 2012 Jungwon Kim, Sangmin Seo, Jun Lee, Jeongho Nah, Gangwon Jo, and Jaejin Lee. “SmuCL: An OpenCL Framework for Heterogeneous CPU/GPU Clusters”. *In Proceedings of the 32th ACM International Conference on Supercomputing*, pages 341-352, Venice, Italy, June 2012. Acceptance Rate: 22%
- PACT 2011 Jun Lee, Jungwon Kim, Junghyun Kim, Sangmin Seo, and Jaejin Lee. “An OpenCL Framework for Homogeneous Manycores with no Hardware Cache Coherence”. *In Proceedings of the 20th ACM/IEEE/IFIP International Conference on Parallel Architectures and Compilation Techniques*, pages 56-67, Galveston Island, Texas, USA, October 2011. Acceptance Rate: 16%
- LCTES 2011 Choonki Jang, Jungwon Kim, Jaejin Lee, Hee-Seok Kim, Dong-Hoon Yoo, Sujkin Kim, Hong-Seok Kim and Soojung Ryu. “An Instruction-Scheduling-Aware Data Partitioning Technique for Coarse-Grained Reconfigurable Architectures”. *In Proceedings of the ACM SIGPLAN/SIGBED 2011 International Conference on Languages, Compilers, and Tools for Embedded Systems*, pages 151-160, Chicago, Illinois, USA, April 2011. Acceptance Rate: 33%
- PPoPP 2011 Jungwon Kim, Honggyu Kim, Joo Hwan Lee, and Jaejin Lee. “Achieving a Single Compute Device Image in OpenCL for Multiple GPUs”. *In Proceedings of the 16th ACM SIGPLAN Annual Symposium on Principles and Practice of Parallel Programming*, pages 277-287, San Antonio, Texas, USA, February 2011. Acceptance Rate: 15%
- PACT 2010 Jaejin Lee, Jungwon Kim, Sangmin Seo, Seungkyun Kim, Jungho Park, Honggyu Kim, Thanh Tuan Dao, Yongjin Cho, Sung Jong Seo, Seung Hak Lee, Seung Mo Cho, Hyo Jung Song, Sang-Bum Suh, and Jong-Deok Choi. “An OpenCL Framework for Heterogeneous Multicores with Local Memory”. *In Proceedings of the 19th ACM/IEEE/IFIP International Conference on Parallel Architectures and Compilation Techniques*, pages 193-204, Vienna, Austria, September 2010. Acceptance Rate: 17%
- HPCA 2010 Jaejin Lee, Jun Lee, Sangmin Seo, Jungwon Kim, Seungkyun Kim, and Zehra Sura. “COMIC++: A Software SVM System for Heterogeneous Multicore Accelerator Clusters”. *In Proceedings of the 16th IEEE International Symposium on High Performance Computer Architecture*, pages 329-340, Bangalore, India, January 2010. Acceptance Rate: 18%
- PACT 2008 Jaein Lee, Sangmin Seo, Chihun Kim, Junghyun Kim, Posung Chun, Zehra Sura, Jungwon Kim, and Sangyong Han. “COMIC: A Coherent Shared Memory Interface for Cell BE”. *In Proceedings fo the 17th International Conference on Parallel Architecture and Compilation Techniques*, pages 303-314, Toronto, Canada, October 2008. Acceptance Rate: 18%

Journals

- TPDS 2015 Thanh Tuan Dao, Jungwon Kim, Sangmin Seo, Bernhard Egger, and Jaejin Lee. “A Performance Model for GPUs with Caches”. *IEEE Transactions on Parallel and Distributed Systems*, Volume 26, Issue 7, pages 1800-1813, 2015. Impact Factor: 2.661
- TPDS 2015 Gangwon Jo, Jeongho Nah, Jun Lee, Jungwon Kim, and Jaejin Lee. “Accelerating LINPACK with MPI-OpenCL on Clusters of Multi-GPU Nodes”. *IEEE Transactions on Parallel and Distributed Systems*, Volume 26, Issue 7, pages 1814-1825, 2015. Impact Factor: 2.661

Workshops

- AsHES 2017 Michael Wolfe, Seyong Lee, Jungwon Kim, Xiaonan Tian, Rengan Xu, Sunita Chandrasekaran and Barbara Chapman. “Implementing the OpenACC Data Model”, *In Proceedings of the 7th International Workshop on Accelerators and Hybrid Exascale Systems*, Orlando, Florida, USA, May 2017. Acceptance Rate: 100%
- LCPC 2011 Jungwon Kim, Sangmin Seo, Jun Lee, Jeongho Nah, Gangwon Jo, and Jaejin Lee. “OpenCL as a Programming Model for GPU Clusters”. *In Proceedings of the 24th International Workshop on Languages and Compilers for Parallel Computing*, pages 76-90, Fort Collins, Colorado, USA, September 2011. Acceptance Rate: 36%

Posters

- PPoPP 2015 Jungwon Kim, Seyong Lee, and Jeffrey S. Vetter. “An OpenACC-Based Unified Programming Model for Multi-Accelerator Systems”. *In Proceedings of the 20th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, pages 257-258, Bay Area, California, USA, February 2015.
- PPoPP 2012 Jungwon Kim, Sangmin Seo, Jun Lee, Jeongho Nah, Gangwon Jo, and Jaejin Lee. “OpenCL as a Unified Programming Model for Heterogeneous CPU/GPU Clusters”. *In Proceedings of the 17th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, pages 299-300, New Orleans, Louisiana, USA, February 2012.

Patents

- 2016 Jaejin Lee and Jungwon Kim. “Cluster System Based on Parallel Computing Framework, and Host Node, Computing Node and Method for Executing Application Therein”. *US Patent 9485303B2*, November 2016.
- 2016 Jaejin Lee and Jungwon Kim. “Method of Executing Parallel Application on Manycore Cluster System and the Manycore Cluster System”. *US Patent 9396033B2*, July 2016.
- 2013 Jungwon Kim, Jaejin Lee, Kyu-Won Kim, and Sung-Kwan Heo. “Method for Scaling Voltage in Mobile Terminal”. *US Patent 8395701B2*, March 2013.

Programming Languages, Models, and Tools

C, C++, Java, CUDA, OpenCL, MPI, OpenMP, OpenACC, LLVM Clang