Jaemin Choi

PhD Candidate, Department of Computer Science
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RESEARCH TOPICS

GPU-accelerated High Performance Computing, Asynchronous Task-based Runtime, Performance Modeling, Distributed Deep Learning

EDUCATION

Doctor of Philosophy (PhD), Computer Science
Univeristy of Illinois Urbana-Champaign - Urbana, Illinois
Aug 2016 - Present

Bachelor of Science (BS), Computer Science and Engineering
Seoul National University - Seoul, Korea
Mar 2010 - Feb 2016

EXPERIENCE

Research Assistant   Aug 2016 - Present
Parallel Programming Laboratory, University of Illinois Urbana-Champaign
- GPU support in Charm++ parallel programming system
- Asynchronous progress of GPU tasks for computation-communication overlap
- Inter-GPU communication using GPUDirect, CUDA IPC and UCX
- Particle mesh Ewald (PME) with Intel OneAPI in NAMD
- Tree-based astrophysical simulations with ChaNGa and ParaTreeT
- Distributed deep learning with Charm4Py and PyTorch

Research Intern   May - Aug 2019
Lawrence Livermore National Laboratory - Livermore, CA
- Performance modeling and optimizations of GPU-accelerated Exascale Computing Project (ECP) proxy applications including SW4lite and MiniFE

Technology Research Intern   May - Aug 2018
Walt Disney Animation Studios - Burbank, CA
- Memory usage optimization in Hyperion, a parallel path-tracing renderer

Undergraduate Research Assistant   Jun 2015 - Apr 2016
Center for Manycore Programming, Seoul National University
- Distributed shared memory implementation of SnuCL using RDMA

Undergraduate Research Assistant   Feb - Jun 2015
Computer Systems and Platforms Laboratory, Seoul National University
- Linux network driver in A2 OS for Intel Single-chip Cloud Computer

PUBLICATIONS

Jaemin Choi, Zane Fink, Sam White, Nitin Bhat, David F. Richards, Laxmikant V. Kale. 2021. GPU-aware Communication with UCX in Parallel Programming Models: Charm++, MPI, and Python. In *Eleventh International Workshop on Accelerators and Hybrid Emerging Systems (AsHES'21), in conjunction with IPDPS'21.* (To appear)

Jaemin Choi, David F. Richards, Laxmikant V. Kale. 2020. Achieving Computation-Communication Overlap with Overdecomposition on GPU Systems. In *2020 IEEE/ACM 5th International Workshop on Extreme Scale Programming Models and Middleware (ESPM2'20), in conjunction with SC'20.*

Jaemin Choi, David F. Richards, Laxmikant V. Kale, and Abhinav Bhatele. 2020. End-to-end Performance Modeling of Distributed GPU Applications. In *2020 International Conference on Supercomputing (ICS '20).*

POSTERS	**Jaemin Choi**, David F. Richards, and Abhinav Bhatele. 2019. Fast Profiling-based Performance Modeling of Distributed GPU Applications. In *ACM Student Research Competition at 2019 International Conference for High Performance Computing, Networking Storage and Analysis (SC '19).*

Jaemin Choi, and Laxmikant V. Kale. 2017. Runtime Support for Concurrent Execution of Overdecomposed Heterogeneous Tasks. In *ACM Student Research Competition at 2017 International Conference for High Performance Computing, Networking Storage and Analysis (SC '17).*

TALKS	Nitin Bhat, **Jaemin Choi**. 2020. Charm++ with UCX. In *UCF Virtual Workshop 2020.*

Jaemin Choi. 2020. Improving the Performance of Overdecomposed Applications on GPU-accelerated Systems. In *15th CSL Student Conference (CSLSC '20) at University of Illinois Urbana-Champaign.* **Best Presentation Award.**

Jaemin Choi. 2019. Messaging with GPU-resident Data. In *Charm++ and AMPI: Adaptive and Asynchronous Parallel Programming, Birds of a Feather at 2019 International Conference for High Performance Computing, Networking Storage and Analysis (SC '19).*

Jaemin Choi. 2019. Distributed Deep Learning: Leveraging Heterogeneity and Data-Parallelism. In *17th Annual Workshop on Charm++ and Its Applications.*

Jaemin Choi. 2019. Interoperability of Shared Memory Parallel Programming Models with Charm++. In *17th Annual Workshop on Charm++ and Its Applications.*

Jaemin Choi. 2018. Recent Advances in Heterogeneous Computing using Charm++. In *16th Annual Workshop on Charm++ and Its Applications.*

Laxmikant Kale, Michael Robson, Ronak Buch, and **Jaemin Choi**. 2017. Migratable Objects and Task-Based Parallel Programming with Charm++. *Tutorial at 2017 International Conference for High Performance Computing, Networking Storage and Analysis (SC '17).*

AWARDS & HONORS	*HPC Session Best Presentation Award*	Feb 2020
	15th CSL Student Conference (CSLSC '20), University of Illinois Urbana-Champaign	
	Graduated with Honors (Cum Laude)	Feb 2016
	Seoul National University	
	National Science and Technology Scholarship	Mar 2010 - Feb 2016
	Korea Scholarship Foundation	
ACTIVITIES	*Chair Positions*	2018 - 2020
	Annual Workshop on Charm++ and Its Applications	
	Student Volunteer	Nov 2017
	SC '17, Denver, Colorado	
	SNU Tomorrow's Edge Membership (STEM)	Dec 2014 - Feb 2016
	Honor Society, College of Engineering, Seoul National University	

Korean Augmentation to the United States Army (KATUSA)   Apr 2011 - Jan 2013
Military Service, KATUSA Training Academy/NCO Academy, Camp Jackson

TECHNICAL   *Programming Languages:* C, C++, Python
SKILLS   *Parallel/Distributed Programming:* MPI, Charm++, CUDA, oneAPI