Kun Li

Personal Information

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Biography

Kun Li received the B.E. degree in computer science and technology from Shandong University in 2016. He is currently pursuing the PhD degree with the State Key Laboratory of Computer Architecture, Institute of Computing Technology, Chinese Academy of Sciences under supervision of Prof. Yunquan Zhang. His research focuses on parallel and distributed systems, high performance computing and machine learning. Academically, he has published 12 papers in international journals and conference proceedings during the PhD time and 4 of them have been accepted at SC'19/SC'21/TPDS (Ranked CCF-A in Computer Architecture Area). As for the industry impact, his contributions have been adopted in domestic software ecology, such as OpenKMC for China Institute of Atomic Energy, AGCM for Institute of Atmospheric Physics in Chinese Academy of Sciences, swMD for Sunway Taihulight supercomputer, and AutoFFT for Huawei Company.

Education

Institute of Computing Technology, Chinese Academy of Sciences — Beijing
Ph.D. candidate in Computer Architecture (State Key Lab) — *Jul 2016 – Jul 2022*

Shandong University — Jinan, Shandong
B.E. in Computer Science and Technology (Elite Class) — *Sep 2012 – Jul 2016*

Internship

Microsoft Research Asia — Beijing
Intern in System Research Group — *Aug 2021 – Dec 2021*

Scholarships

Sugon Scholarship (Top 5%), University of Chinese Academy of Sciences, 2020.
Outstanding Student Scholarship (Grade 1, Top 10%), University of Chinese Academy of Sciences, 2020.
Outstanding Academic Conference Scholarship, University of Chinese Academy of Sciences, 2020.
Outstanding Student Scholarship (Grade 1), CARCH, 2019 & 2020.

Selected Awards

Excellent Student Cadre, University of Chinese Academy of Sciences, 2017 & 2018
Merit Student, University of Chinese Academy of Sciences, 2017 & 2018
Outstanding Communist Member, University of Chinese Academy of Sciences, 2017 & 2018
Outstanding Volunteer, University of Chinese Academy of Sciences, 2017 & 2018
Huawei Outstanding Achievement Award, Huawei Company, 2017
Bronze Award, National Parallel Challenge, 2016
Second Prize, National Information Security Contest, 2016

Projects

Research of Distributed Scientific Computing on CPU+GPU — *Aug 2021 – Present*
Microsoft Research Asia Internship program
- Deploy WRF model on Tianhe-2 and Sunway Taihulight with standard cases.
- Explore auto-tuning distributed design on heterogenous architectures.

Research of Large-Scale Clustering and Regression — *Nov 2020 – Aug 2021*
- Accurate, fast, and parameter-free clustering.
- Explore efficient parallel regression through clustering.

Vectorization for Stencil Computation *Dec 2019 – Nov 2020*
National High Technology Research and Development Program of China (863)
• Explore high performance vectorization in stencil computation.

Research and Development of Prototype System for Numerical Reactor *Nov 2018 – Nov 2019*
National Key Research and Development Program
• Develop open-source kinetic Monte Carlo software OpenKMC with a good scalability over 5.2 million cores.
• It has been used for research by China institute of atomic energy (CIAE).

Reasearch of Large-scale Molecular Dynamics Simulation *Dec 2017 – Oct 2018*
National Key Research and Development Program, Peking University Joint Key Program
• Design efficient FastNBL algorithm and Vectorization on Intel Xeon/ARM-v8/SW26010 over 266,240 cores.

Research and Development of Optimization Technique on Million Cores *Jul 2017 – Nov 2018*
Huawei Class-A Scientific Research Program
• Develop r2c part of FFT library by using many-core architecture on Sunway Taihulight.

The Science Data Process in Square Kilometre Array (SKA) *Oct 2016 – Jun 2017*
The National Natural Science Foundation, National Key Research and Development Program
• Noise reduction processing of pulsar signal with optimized FFT algorithm on TH-1 and TH-2.

Publications

- **[IEEE TPDS, CCF-A]** Li K, Yuan L, Zhang Y, Chen G. An Accurate and Efficient Large-scale Regression Method through Best Friend Clustering. Transactions on Parallel and Distributed Systems.
- **[SC'21, CCF-A]** Li K, Yuan L, Zhang Y, Yue Y. Reducing Redundancy in Data Organization and Arithmetic Calculation for Stencil Computations.Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, ACM, 2021.
- **[SC'21, CCF-A]** Yuan L, Zhang Y, Cao H, Li K, et al. Temporal Vectorization for Stencils. Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis, ACM, 2021.
- **[SC'19, CCF-A]** Li K, Shang H, Zhang Y, et al. OpenKMC : a KMC design for hundred-billion-atom simulation using millions of cores on Sunway Taihulight. Proceedings of the International Conference for High Performance Computing, Networking, Storage and Analysis. ACM, 2019 : 68.
- **[CS'19, CCF-B]** Wang D, Shang H, Zhang Y, Li K, et al. Application of Atomic Dynamics Monte Carlo Program MISA-KMC in the Study of Irradiation Damage of Reactor Pressure Vessel Steel. Computer Science.
- **[TJSC'19, CCF-B]** Li K, Li S, Huang S, et al. FastNBL : fast neighbor lists establishment for molecular dynamics simulation based on bitwise operations. The Journal of Supercomputing, 2019 : 1-20.
- **[ISPA'19, CCF-C]** Li K, Li S, Wang B, et al. swMD : Performance Optimizations for MolecularDynamics Simulation on Sunway Taihulight. 2019 IEEE Intl Conf on Parallel & Distributed Processing with Applications.
- **[ICPP'18, CCF-B]** Xiao J, Li S, Wu B, Li K, et al. Communication-Avoiding for Dynamical Core of Atmospheric General Circulation Model. Proceedings of the 47th International Conference on Parallel Processing. ACM, 2018 : 12.
- **[JCST'17, CCF-B]** Li K, Jia H, Cao T, et al. The Implementation and Optimization of Multidimensional FFT Algorithm on Large-scale Clusters. The Journal of Frontiers of Computer Science and Technology, 2017 : 863-874.
- **[HPCChina'16]** Li K, Li Y, Cao T, et al. An MPI-based 3D FFT Implementation on CPUGPU Heterogeneous Clusters. National Annual Conference on High Performance Computing 2016.

- **[To be appeared]** Li K, Yuan L, Zhang Y, et al. An Efficient Vectorization Scheme for Stencil Computation.
- **[To be appeared]** Lu P, Yuan L, Zhang Y, Li K. AutoFlow : Hotspot-Aware, Dynamic Load Balancing for Distributed Stream Processing.

Patents

Li S, Li K, Chen Y, Zhang Y. CN109032667A, A fast neighbor list method for molecular dynamics simulation.
Li S, Li K, Wu B, Zhang Y. CN109840306A, An optimized communication method and system for parallel fast Fourier transform based on recursion.

Service

Reviewer of the Journal of Supercomputing, 2020 & 2021.
Reviewer of International Conference on High Performance Big Data and Intelligent Systems, 2021.
Reviewer of National Annual Conference on High Performance Computing, 2018 & 2019.
Volunteer of International Conference on Supercomputing, 2018.

Activities

Chairman of Student Union in ICT, 2018.
President of Career Development Association in ICT, 2018.
Youth League Committee Member of ICT, 2017 - present.
Volunteer for 140+ hours so far.