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 Ph.D. 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 high performance computing (HPC), e.g. optimization of large-scale scientific computing applications, design for parallel numerical algorithm, and development of distributed machine learning framework.

He has authored featured publications at prestigious international conferences and journals like SC19/21, IEEE TPDS, TJSC, etc. His contributions have also 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, etc.

Education

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

2021 National Scholarship for Graduate Students ($< 0.1\%$).
2021 CAS-BHBT Joint Scholarship of University of Chinese Academy of Sciences ($< 1\%$).
2020 Sugon Scholarship of University of Chinese Academy of Sciences ($< 1\%$).
2020 Outstanding Ph.D. Students Scholarship of University of Chinese Academy of Sciences (Grade 1, $< 10\%$).
2020 Outstanding Student Scholarship of State Key Lab. of Computer Architecture (Grade 1).
2019 International Academic Conference Scholarship of University of Chinese Academy of Sciences.
2019 Outstanding Student Scholarship of State Key Lab. of Computer Architecture (Grade 1).
2017 Outstanding Undergraduate Scholarship of University of Chinese Academy of Sciences.

Selected Awards

2020 Outstanding Student of the State Key Lab. of Computer Architecture, ICT, CAS.
2017&2018 Excellent Student Cadre of University of Chinese Academy of Sciences.
2017&2018 Merit Student of 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 Outstanding Cooperation Award of the Huawei Technologies Co., Ltd.
2016 Bronze Award of National Parallel Challenge
2016 Second Prize of National Information Security Contest.

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 – Jul 2021*
Natural Science Foundation of Beijing
- Accurate, fast, and parameter-free clustering.
- Explore efficient parallel regression through clustering.

Vectorization for Stencils *Dec 2019 – Oct 2020*
National High Technology Research and Development Program of China (863)
- Explore high performance vectorization for stencil computation in atmospheric simulation.

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.

The Science Data Process in Square Kilometre Array (SKA) *Oct 2016 – Nov 2017*
The National Natural Science Foundation, National Key Research and Development Program
- Develop high performance FFT library by using many-core architecture on Sunway Taihulight supercomputer.
- 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

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

Activities

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