Qinglei Cao

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RESEARCH INTERESTS

High performance computing (HPC) and Artificial Intelligence (AI), including Task-based runtime systems, Linear algebra algorithms, and Large-scale machine learning & deep learning

EDUCATION

The University of Tennessee, Knoxville (UTK), Computer Science — 2016 - 2022
PhD, High Performance Computing
Advisor: Dr. Jack Dongarra (**Turing Award, 2021**)
Group Leader & Co-Advisor: Dr. George Bosilca

Ocean University of China (OUC), Computer Application Technology — 2013 - 2016
MS, Image Processing & Parallel Computing
Advisors: Dr. Yuntao Qian (Zhejiang University), Dr. Zhiqiang Wei (OUC)

Hunan University (HNU), Information and Computational Science — 2005 - 2009
BS, Mathematics

PROFESSIONAL EXPERIENCE

Department of Computer Science, Saint Louis University (SLU) — St. Louis, MO
Assistant Professor — 2023 - Present

Innovative Computer Laboratory (ICL), UTK — Knoxville, TN
Post-Doctoral Research Associate — 2023

Cerebras Systems, Inc. — Sunnyvale, CA
Member of Technical Staff — 2022 - 2023

Innovative Computer Laboratory (ICL), UTK — Knoxville, TN
Graduate Research Assistant — 2017 - 2022

Cerebras Systems, Inc. — Sunnyvale, CA
Summer Intern — 2021

Cadence Design Systems, Inc. — Austin, TX
Summer Intern — 2020

National University of Defense Technology (NUDT) — Changsha, China
HPC Software Developer & Research Scientist — 2010 - 2013

HONORS & AWARDS

- 206,780 Node Hours on Summit Supercomputer, Oak Ridge National Laboratory, US — 2024
- 3,000,000 Node Hours on Shaheen II Supercomputer, KAUST, Saudi Arabia — 2019 - 2023
- ACM Gordon Bell Prize Finalist — 2022
- 4,000,000 Node Hours on Fugaku Supercomputer, RIKEN, Japan — 2022
- SIAM Student Travel Award — 2021
- 40,000 Node Hours on Summit Supercomputer, Oak Ridge National Laboratory, US — 2021
- Best Paper Award, CLUSTER — 2020
- Graduate Student Senate (GSS) Travel Awards, UTK — 2020
- Honor of Outstanding Graduates, OUC — 2014

- ◇ Graduate Student Scholarship, OUC 2014
- ◇ Honor of Annual Advanced Worker, NUDT 2010, 2011
- ◇ Honor of Bronze Medal of TH-1A, NUDT 2010
- ◇ Outstanding Scholarship, HNU 2006, 2007
- ◇ Honor of Excellent Student Cadre, HNU 2006

PUBLICATIONS

1 **Qinglei Cao**, Sameh Abdulah, Hatem Ltaief, Marc G Genton, David E Keyes, and George Bosilca. Reducing Data Motion and Energy Consumption of Geospatial Modeling Applications Using Automated Precision Conversion. IEEE International Conference on Cluster Computing (CLUSTER), 2023

2 **Qinglei Cao**, Sameh Abdulah, Rabab Alomairy, Yu Pei, Pratik Nag, George Bosilca, Jack Dongarra, Marc G Genton, David E Keyes, Hatem Ltaief, and Ying Sun. Reshaping geostatistical modeling and prediction for extreme-scale environmental applications. International Conference for High Performance Computing, Networking, Storage and Analysis (SC, ACM Gordon Bell Prize Finalist), 2022

3 **Qinglei Cao**, Rabab Alomairy, Yu Pei, George Bosilca, Hatem Ltaief, David Keyes, and Jack Dongarra. A framework to exploit data sparsity in tile low-rank Cholesky factorization. IEEE International Parallel & Distributed Processing Symposium (IPDPS), 2022

4 **Qinglei Cao**, George Bosilca, Nuria Losada, Wei Wu, Dong Zhong, and Jack Dongarra. Evaluating data redistribution in parsec. IEEE Transactions on Parallel and Distributed Systems (TPDS), 2022

5 Sameh Abdulah, **Qinglei Cao***, Yu Pei, George Bosilca, Jack Dongarra, Marc G. Genton, David E. Keyes, Hatem Ltaief, and Ying Sun. Accelerating geostatistical modeling and prediction with mixed-precision computations: A high-productivity approach with parsec. IEEE Transactions on Parallel and Distributed Systems (TPDS), 2022

6 **Qinglei Cao**, Yu Pei, Kadir Akbudak, George Bosilca, Hatem Ltaief, David Keyes, and Jack Dongarra. Leveraging parsec runtime support to tackle challenging 3d data-sparse matrix problems. IEEE International Parallel and Distributed Processing Symposium (IPDPS), 2021

7 Dong Zhong, **Qinglei Cao**, George Bosilca, and Jack Dongarra. Using long vector extensions for MPI reductions. Parallel Computing (PARCO), 2021

8 Yunhe Feng, Dong Zhong, Peng Sun, Weijian Zheng, **Qinglei Cao**, Xi Luo, and Zheng Lu. Micromobility in smart cities: A closer look at shared dockless e-scooters via big social data. IEEE International Conference on Communications (ICC), 2021

9 **Qinglei Cao**, George Bosilca, Wei Wu, Dong Zhong, Aurelien Bouteiller, and Jack Dongarra. Flexible data redistribution in a task-based runtime system. IEEE International Conference on Cluster Computing (CLUSTER), 2020

10 **Qinglei Cao**, Yu Pei, Kadir Akbudak, Aleksandr Mikhalev, George Bosilca, Hatem Ltaief, David Keyes, and Jack Dongarra. Extreme-Scale Tile Low-Rank Cholesky Factorization Using the PaRSEC Task-Based Runtime. ACM Platform for Advanced Scientific Computing Conference (PASC), 2020

11 **Qinglei Cao**, Yu Pei, Kadir Akbudak, Aleksandr Mikhalev, George Bosilca, Hatem Ltaief, David Keyes, and Jack Dongarra. Extreme-scale task-based Cholesky factorization toward climate and weather prediction applications. ACM Platform for Advanced Scientific Computing Conference (PASC Poster), 2020

12 Elliott Slaughter, Wei Wu, Yuankun Fu, Legend Brandenburg, Nicolai Garcia, Wilhem Kautz, Emily Marx, Kaleb S. Morris, **Qinglei Cao**, George Bosilca, Seema Mirchandaney, Wonchan Lee, Sean Treichler, Patrick McCormick, and Alex Aiken. Task bench: a parameterized benchmark for evaluating parallel runtime performance. IEEE/ACM International Conference for High Performance Computing, Networking, Storage and Analysis (SC), 2020

13 Xi Luo, Wei Wu, George Bosilca, Yu Pei, **Qinglei Cao**, Thananon Patinyasakdikul, Dong Zhong, and Jack Dongarra. Han: a hierarchical autotuned collective communication framework. IEEE International Conference on Cluster Computing (CLUSTER, Best paper), 2020

14 Dong Zhong, **Qinglei Cao**, George Bosilca, and Jack Dongarra. Using advanced vector extensions AVX-512 for MPI reductions. ACM European MPI Users' Group Meeting (EuroMPI), 2020

15 Dong Zhong, Pavel Shamis, **Qinglei Cao**, George Bosilca, Shinji Sumimoto, Kenichi Miura, and Jack Dongarra. Using ARM scalable vector extension to optimize OpenMPI. IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGRID), 2020

16 Yu Pei, **Qinglei Cao**, George Bosilca, Piotr Luszczek, Victor Eijkhout, and Jack Dongarra. Communication avoiding 2d stencil implementations over PaRSEC task-based runtime. IEEE International Parallel and Distributed Processing Symposium Workshops (IPDPSW), 2020

17 **Qinglei Cao**, Yu Pei, Thomas Herault, Kadir Akbudak, Aleksandr Mikhalev, George Bosilca, Hatem Ltaief, David Keyes, and Jack Dongarra. Performance analysis of tile low-rank Cholesky factorization using parsec instrumentation tools. IEEE/ACM International Workshop on Programming and Performance Visualization Tools (ProTools at SC), 2019

18 Yan Yan, Jie Nie, Lei Huang, Zhen Li, **Qinglei Cao**, and Zhiqiang Wei. Exploring relationship between face and trustworthy impression using mid-level facial features. International Conference on Multimedia Modeling (MMM), 2016

19 Yan Yan, Jie Nie, Lei Huang, Zhen Li, **Qinglei Cao**, and Zhiqiang Wei. Is your first impression reliable? trustworthy analysis using facial traits in portraits. International Conference on Multimedia Modeling (MMM), 2015

PROFESSIONAL ACTIVITIES

◇ Editorial Board

- ☞ American Journal of Computer Science and Technology 2023

◇ Technical Program Committee

- ☞ International Conference on Parallel Processing (ICPP) 2024
- ☞ Association for the Advancement of Artificial Intelligence (AAAI) Undergraduate Consortium 2024
- ☞ International Supercomputing Conference (ISC) High Performance 2024
- ☞ International Parallel & Distributed Processing Symposium (IPDPS) 2024
- ☞ Workshop on HPC on Heterogeneous Hardware 2022, 2023
- ☞ Intl Conference for High Performance Computing, Networking, Storage and Analysis AD/AE (SC) 2021
- ☞ Intl Conference on Advances and Trends in Software Engineering (SOFTENG) 2021 - 2024

◇ Conference & Journal External Reviewer

- ☞ Parallel Computing 2023
- ☞ Journal of Supercomputing 2023
- ☞ IEEE Transactions on Multimedia 2023
- ☞ ACM Transactions on Mathematical Software (TOMS) 2023
- ☞ International Conference on Emerging Information Security and Applications 2022
- ☞ Intl Conference for High Performance Computing, Networking, Storage and Analysis (SC) 2020, 2021
- ☞ PeerJ Computer Science 2021
- ☞ International Conference on Cluster Computing (CLUSTER) 2020
- ☞ International Conferences on High Performance Computing and Communications (HPCC) 2020, 2021

TEACHING EXPERIENCE

◇ **Lecturer**

☞ CSCI 4620/5620 **Distributed Computing** Fall 2023, SLU

◇ **Teaching Assistant**

☞ COSC 594 **Scientific Computing for Engineers** Spring 2018, UTK

☞ COSC 361 **Operating Systems** Spring 2017, UTK

☞ COSC 361 **Operating Systems** Fall 2016, UTK

◇ **Guest Lecturer**

☞ CSCI 5090 **Computer Science Colloquium** Fall 2023, SLU

☞ CSCE 5300 **Introduction to Big Data and Data Science** Fall 2023, UNT

☞ CSCE 5300 **Introduction to Big Data and Data Science** Spring 2023, UNT

PRESENTATION & TALK

◇ **Paper Presentation**

☞ International Conference on Cluster Computing (CLUSTER) 2023

☞ International Parallel and Distributed Processing Symposium (IPDPS) 2021, 2022

☞ International Conference on Cluster Computing (CLUSTER) 2020

☞ Platform for Advanced Scientific Computing Conference (PASC) 2020

☞ International Workshop on Programming and Performance Visualization Tools (ProTools at SC) 2019

◇ **Talk**

☞ Innovative Computer Laboratory (ICL) Lunch Talk 2019, 2020, 2021, 2022

☞ Joint Laboratory on Extreme Scale Computing Workshop (JLESC) 2021

☞ SIAM Conference on Computational Science and Engineering (CSE) 2021

☞ SIAM Conference on Parallel Processing for Scientific Computing (PP) 2020

◇ **Poster**

☞ Joint Laboratory on Extreme Scale Computing Workshop (JLESC) 2020

☞ Platform for Advanced Scientific Computing Conference (PASC) 2020

OPEN SOURCE CONTRIBUTIONS

◇ [**PaRSEC**]: Task-based runtime system, funded by Exascale Computing Project (ECP)

◇ [**DPLASMA**]: Leading implementation of a dense linear algebra package for distributed system

◇ [**HiCMA**]: Low-rank math library of exploiting the data sparsity of the matrix operator

◇ [**ExaGeostat**]: Parallel high performance unified framework for computational geostatistics

MEDIA COVERAGE

◇ Gordon Bell Prize Finalists Develop Method for More Efficient Computing[AAAS Eurekalert][HLRS News]

◇ KAUST Supercomputing Expertise Shines at SC22[KUAST News]

◇ Inside the Gordon Bell Prize Finalist Projects[HPCwire]

◇ SC22 Unveils ACM Gordon Bell Prize Finalists[HPCwire]

◇ 2022 ACM Gordon Bell Prize Finalists Announced[Communications of the ACM]

◇ What's New in HPC Research: EXA2PRO, DQRA, and HiCMA-PaRSE Frameworks & More[HPCwire]

◇ KAUST Leverages Mixed Precision for Geospatial Data[HPCwire]

◇ Mixing Precision for Model Acceleration[Tech Xplore]

◇ Mixing It Up: Saudi Researchers Accelerate Environmental Models with Mixed Precision[Nvidia]

◇ 「富岳」を用いた3つの研究成果がゴードン・ベル賞ファイナリストに選出されました[RIKEN News]

Last updated: January 3, 2024