

Dr. SHENG DI

Computer Scientist, Mathematics and Computer Science Division (MCS), Argonne National Laboratory

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Google Scholar citations: <https://scholar.google.co.il/citations?user=zh3foWUAAAAJ&hl=en>



Education

- 2007~2011/2012, Ph.D., The University of Hong Kong, Hong Kong, China
- 2004~2007, M.Phil./Master's degree, Department of Computer Science, Huazhong University of Science and Technology, Wuhan, China
- 2000~2004, B.S., Computer Science, South-Central University for Nationalities, China

Research Experience

- 2019~present Computer Scientist, MCS, Argonne National Laboratory
- 2017~2019 Assistant Computer Scientist, MCS, Argonne National Laboratory
- 2014~2017 Postdoctoral Fellow, Argonne National Laboratory
- 2012~2014 Postdoctoral Researcher, INRIA (France)

Academic Accomplishments (2006-2024)

- **160+** refereed journal/conference/workshop publications
- **130+** invited reviews on international conference/journal papers
- **50+** invited program committee members or program chairs
- **5,699** citations of publications (based on Google Scholar up to July/31/2024)
- h-index=**39**, i10-index=**100** (based on Google Scholar)
- **50+** invited talks/presentations
- **10+** key software/libraries in the HPC and cloud community
- **40+** mentored students

Awards and Honors

- 2023, 1st place of ACM SRC award -- Graduates in SC24.
- 2023, Best Paper Candidate/Nomination in ICS2023.
- 2023, Best student poster award in IEEE Cluster2023 (co-mentor).
- 2022, 1st place of ACM SRC award – Undergraduates in SC022 (co-mentor)
- 2022, 2nd place of ACM SRC award -- Graduates in SC2022 (I am the co-mentor)
- 2022, Best paper finalist, IEEE/ACM The International Conference for High Performance computing, Networking, Storage and Analysis (IEEE/ACM SC2022), 2022
- 2022, Best paper award, Proceedings of the 8th International Workshop on Data Reduction for Big Scientific Data (DRBSD8) in conjunction with SC2022, 2022

- 2021, DOE ASCR Early Career Research Program Award (ECRP)
- 2021, DOE R&D 100 award (in recognition of leading SZ – a lossy compression framework for scientific data)
- 2019, DOE R&D 100 award (in recognition of participating in SCR: Scalable Checkpoint/Restart Framework)
- 2019, IEEE-Chicago Distinguished Research and Development Award, in recognition of the research on scientific data compression and contribution to software development
- 2018 IEEE-Chicago Distinguished Mentoring Award, in recognition of mentoring as a scientist in the area of data compression and software development, 2018
- Overall Best paper award and Best paper award in Application, Algorithms and Libraries track: IEEE International Conference on Cluster Computing (IEEE Cluster 2018), 2018
- Best paper award in Data, Storage, and Visualization track: IEEE International Conference on Cluster Computing (IEEE Cluster 2018), 2018
- Best paper nominated: The 8th IEEE Symposium on Large Data Analysis and Visualization (IEEE LDAV) in conjunction with IEEE VIS 2018
- Best paper nominated: IEEE International Conference on Cluster Computing (IEEE Cluster 2014), 2014
- Best paper nominated: 40th International Conference on Parallel Processing (IEEE ICPP2011), 2011
- Best student paper award: International Conference on Utility and Cloud Computing
- Best paper award: International Conference on the Digital Society (IEEE ICDS2008), 2008
- Sum Tuition Scholarship, 2005-2006, Huazhong University of Science and Technology
- "Triple-A" Outstanding Student, 2005-2006, Huazhong University of Science and Technology
- First-Class Scholarship, 2004-2005, Huazhong University of Science and Technology
- Sum Tuition Scholarship, 2004-2005, Huazhong University of Science and Technology
- Excellent Leadership Award, 2003-2004, South-Central University for Nationalities
- Second-Class Scholarship, 2002-2003, South-Central University for Nationalities (top 2%)
- "Triple-A" Outstanding Student, 2002-2003, South-Central University for Nationalities
- First-class Scholarship, 2001-2002, South-Central University for Nationalities (top 1%)
- "Triple-A" Outstanding Student, 2000-2001, South-Central University for Nationalities

Fundings/Grants

- Senior Personnel: **DOE** ZF: A novel framework to design trustworthy lossy compressors for scientific data approaching lossy compressibility limits, 2024-2027.
- Co-PI: **NSF** Collaborative Research: Frameworks: FZ: A fine-tunable cyberinfrastructure framework to streamline specialized lossy compression development (PI: Franck Cappello), 2023-2028. (Funded) (I participated in the design and writing) (\$3.14M)
- Co-PI: **DOE** ASCR distributed resilience FOA: Scalable and Resilient Modeling for Federated-Learning-Based Complex Workflows, 2023-2028 \$4.35M
- PI: **NSF** OAC ROCCI, Elements: ROCCI: "Integrated Cyberinfrastructure for In Situ Lossy Compression Optimization Based on Post Hoc Analysis Requirements" 2021-2024 \$320K.
- PI: **DOE** ASCR SDR (**Early Career Award**): "Scalable Dynamic Scientific Data Reduction" - 2021-2026 \$2.5M.
- Co-PI: **DOE** ASCR Data Reduction: "Automatic Generation of Algorithms for High-Speed Reliable Lossy Compression," 2021-2024. (PI: Martin Burtcher) - \$400,000.

- Co-PI: **NSF**: "CDS&E: Collaborative Research: HyLoC: Objective-driven Adaptive Hybrid Lossy Compression," 2020-2023. (PI: Dingwen Tao) - \$264,429
- Co-PI: **NSF**: "ALETHEIA: A Framework for Automatic Detection/Correction of Corruptions in Extreme Scale Scientific Executions," 2016-2021. (PI: Tom Peterka) - \$250,000
- Senior Personnel: **DOE ECP**: "VeloC-SZ", renewal and combination of the ECP VeloC and ECP VeloC/SZ projects, 2019-2023. (PI: Franck Cappello) - \$4,862,531
- Senior Personnel: **DOE CODAR**: "CODAR: Co-design Center for Online Data Analysis and Reduction at Exascale," 2016-2020 (PI: Ian Foster) - \$5,438,715
- Senior Personnel: **ARAMCO**: "Exploration of Lossy Data Compression for Seismic Imaging Application," 2019-2021. (PI: Franck Cappello) - \$1,026,853

Professional Activities

- Member of ACM
- Senior Member of IEEE
- Scientist at Large through the Consortium for Advanced Science and Engineering at the University of Chicago
- Institute Fellow of Northwestern-Argonne Institute of Science and Engineering (NAISE)

Publications - Refereed Journal Articles

1. Leonardo Bautista-Gomez, Anne Benoit, **Sheng Di**, Thomas Herault, Yves Robert, and Hongyang Sun, "A survey on checkpointing strategies: Should we always checkpoint a la Young/Daly?", Future Generation Computer Systems ([FGCS](#)), 2024,
2. Robert Underwood, Julie Bessac, David Krasowska, Jon C Calhoun, **Sheng Di**, Franck Cappello, "Black-box statistical prediction of lossy compression ratios for scientific data", International Journal of High Performance Computing Applications ([IJHPCA](#)), 2023, Volume 37, Issue 3-4.
3. Robert Underwood, Chun Hong Yoon, Ali M. Gok, **Sheng Di**, Franck Cappello, "ROIBIN-SZ: Fast and Science-Preserving Compression for Serial Crystallography", Journal of Synchrotron Radiation News ([SRN](#)), 2023.
4. Xin Liang, **Sheng Di**, Franck Cappello, Mukund Raj, Chunhui Liu, Kenji Ono, Zizhong Chen, Tom Peterka, and Hanqi Guo, "Toward Feature-Preserving Vector Field Compression," IEEE Transactions on Visualization and Computer Graphics ([IEEE TVCG](#)), 2022.
5. Xin Liang, Kai Zhao, **Sheng Di**, Sihuan Li, Robert Underwood, Ali M. Gok, Jiannan Tian, Junjing Deng, Jon C. Calhoun, Dingwen Tao, Zizhong Chen, Franck Cappello, "SZ3: A Modular Framework for Composing Prediction-Based Error-Bounded Lossy Compressors," IEEE Transactions on Big Data ([IEEE TBD](#)), 2022.
6. Yuanjian Liu, **Sheng Di**, Kai Zhao, Sian Jin, Cheng Wang, Kyle Chard, Dingwen Tao, Ian Foster, Franck Cappello, "Optimizing Error-Bounded Lossy Compression for Scientific Data with Diverse Constraints," IEEE Transactions on Distributed and Computer Systems ([IEEE TPDS](#)), 2022.
7. Ian Foster, Mark Ainsworth, Julie Bessac, Franck Cappello, Jong Choi, **Sheng Di**, et al., "Online Data Analysis and Reduction: An important Co-design Motif for Extreme-Scale Computers," The International Journal of High Performance Computing Applications ([IJHPCA](#)), 2022.
8. Robert Underwood, Jon C. Calhoun, **Sheng Di**, Amy Apon, Franck Cappello, "OptZConfig: Efficient Parallel Optimization of Lossy Compression Configuration," IEEE Transactions on Distributed and Computer Systems ([IEEE TPDS](#)), 2022.
9. Kai Zhao, **Sheng Di**, Sihuan Li, Xin Liang, Yujia Zhai, Jieyang Chen, Kaiming Ouyang, Franck Cappello and Zizhong Chen, "FT-CNN: Algorithm-Based Fault Tolerance for Convolutional Neural Networks," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)) Special Section on Parallel and Distributed Computing Techniques for AI, ML and DL ([TPDS-SS-AI 2020](#)), 2020.

10. Hao Fan, Song Wu, Xinyu Zhao, Zhenjiang Xie, **Sheng Di**, Jiang Xiao, Chen Yu, Hai Jin, "Accelerating Parallel Applications in Cloud Platforms via Adaptive Time-Slice Control," IEEE Transactions on Computers ([IEEE TC](#)), 2020.
11. Xiangyu Zou, Tao Lu, Wen Xia, Xuan Wang, Weizhe Zhang, Haijun Zhang, **Sheng Di**, Dingwen Tao, and Franck Cappello, "Performance Optimization for Relative-Error-Bounded Lossy Compression on Scientific Data," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)), 2020.
12. Franck Cappello, **Sheng Di**, Sihuan Li, Xin Liang, Ali M. Gok, Dingwen Tao, Chun Hong Yoon, Xin-Chuan Wu, Yuri Alexeev, and Federic T. Chong, "Use cases of lossy compression for floating-point data in scientific datasets," in The International Journal of High Performance Computing Applications ([IJHPCA](#)), 33(6), 1201–1220, 2019.
13. Dingwen Tao, **Sheng Di**, Xin Liang, Zizhong Chen, and Franck Cappello, "Optimizing Lossy Compression Rate-Distortion from Automatic Online Selection between SZ and ZFP," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)), 30(8):1857-1871, 2019.
14. **Sheng Di**, Dingwen Tao, Xin Liang, and Franck Cappello, "Efficient Lossy Compression for Scientific Data based on Pointwise Relative Error Bound," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)), 30(2):331-345, 2019.
15. **Sheng Di**, Hanqi Guo, Rinku Gupta, Eric R. Pershey, Marc Snir, and Franck Cappello, "Exploring Properties and Correlations of Fatal Events in a Large-Scale HPC System," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)), 30(2):361-374, 2019.
16. Xinhou Wang, Kezhi Wang, Song Wu, **Sheng Di**, Hai Jin, Kun Yang, and Shumao Ou, "Dynamic Resource Scheduling in Mobile Edge Cloud with Cloud Radio Access Network," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)), 29(11):2429-2445, 2018.
17. Omer Subasi, **Sheng Di**, Leonardo Bautista-Gomez, Prasanna Balaprakash, Osman Unsal, Jesus Labarta, Adrian Cristal, Sriram Krishnamoorthy, and Franck Cappello, "Exploring the Capabilities of Support Vector Machines in Detecting Silent Data Corruptions," Journal of Sustainable Computing, Informatics and Systems ([SUSCOM](#)) 19:277-290, 2018.
18. Eduardo Berrocal, Leonardo Bautista-Gomez, **Sheng Di**, Zhiling Lan, and Franck Cappello, "Toward General Software Level Silent Data Corruption Detection for Parallel Applications," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)) 28(12):3642-3655, 2017.
19. Dingwen Tao, **Sheng Di**, Hanqi Guo, Zizhong Chen, and Franck Cappello, "Z-checker: A Framework for Assessing Lossy Compression of Scientific Data," The International Journal of High Performance Computing Applications ([IJHPCA17](#)) 33(2):285-303, 2017.
20. **Sheng Di** and Franck Cappello, "Optimization of Error-Bounded Lossy Compression for Hard-to-Compress HPC Data," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)) 29(1):129-143, 2017.
21. Song Wu, Yihong Wang, Wei Luo, **Sheng Di**, Haibao Chen, Xiaolin Xu, Hai Jin, and Ran Zheng, "ACStor: Optimizing Access Performance of Virtual Disk Images in Clouds," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)) 28(9):2414-2427, 2017.
22. Xuanhua Shi, Junling Liang, Xuan Luo, **Sheng Di**, Bingsheng He, Lu Lu, and Hai Jin, "Frog: Asynchronous Graph Processing on GPU with Hybrid Coloring Model," IEEE Transactions on Knowledge and Data Engineering ([IEEE TKDE](#)) 30(1):29-42, 2017.
23. **Sheng Di**, Yves Robert, Frédéric Vivien, and Franck Cappello, "Towards an Optimal Online Checkpoint Solution under a Two-Level HPC Checkpoint Model," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)) 28(1):244-259, 2017.
24. **Sheng Di** and Franck Cappello, "Adaptive Impact-Driven Detection of Silent Data Corruption for HPC Applications," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)) 27(10):2809-2823, 2016.
25. Song Wu, Haibao Chen, **Sheng Di**, Bingbing Zhou, Zhenjiang Xie, Hai Jin, and Xuanhua Shi, "Synchronization-Aware Scheduling for Virtual Clusters in Cloud," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)) 26(10):2880-2902, 2014.

26. Hai Jin, Xinhou Wang, Song Wu, **Sheng Di**, and Xuanhua Shi, "Towards Optimized Fine-Grained Pricing of IaaS Platform," IEEE Transactions on Cloud Computing ([IEEE TCC](#)) 3(4):436-448, 2014.
27. **Sheng Di** and Franck Cappello, "GloadSim: Google Trace based Cloud Simulator with Virtual Machines," Journal of Software – Practice and Experience ([Wiley SPE](#)) 45(11), 1571-1590, 2014.
28. **Sheng Di**, Derrick Kondo, and Franck Cappello, "Characterizing and Modeling Cloud Applications/Jobs on a Google Data Center," Journal of Supercomputing ([Springer JS](#)), 69(1):139-160, 2014.
29. **Sheng Di**, Derrick Kondo, and Cho-Li Wang, "Optimization of Composite Cloud Service Processing with Virtual Machines," IEEE Transactions on Computers ([IEEE TC](#)) 2014.
30. **Sheng Di**, Derrick Kondo, and Walfredo Cirne, "Google Hostload Prediction based on Bayesian Model with Optimized Feature Combination," Journal of Parallel Distributed Computing ([Elsevier JPDC](#)) 74(1):1820-1832, 2014.
31. **Sheng Di** and Cho-Li Wang, "Error-Tolerant Resource Allocation and Payment Minimization for Cloud System," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)) 24(6): 1097-1106, 2013.
32. **Sheng Di**, Cho-Li Wang, and Franck Cappello, "Adaptive Algorithm for Minimizing Cloud Task Length with Load Prediction Errors," IEEE Transactions on Cloud Computing ([IEEE TCC](#)) 2(2):194-207, 2013.
33. **Sheng Di**, Cho-Li Wang, and Ling Chen, "Ex-Post Efficient Resource Allocation for Self-organizing Cloud," Journal of Computers and Electrical Engineering ([elsevier JCEE](#)), 39(7):2342-2356, 2013, <http://dx.doi.org/10.1016/j.compeleceng.2012.12.018>.
34. **Sheng Di** and Cho-Li Wang, "Dynamic Optimization of Multi-Attribute Resource Allocation in Self-Organizing Clouds," IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)) 24(3):464-478, 2012, <http://doi.ieeecomputersociety.org/10.1109/TPDS.2013.144>.
35. **Sheng Di** and Cho-Li Wang, "Decentralized Proactive Resource Allocation for Maximizing Throughput of P2P Grid," Journal of Parallel Distributed Computing ([Elsevier JPDC](#)), 72(2):308-321, 2012, [doi:10.1016/j.jpdc.2011.10.010](https://doi.org/10.1016/j.jpdc.2011.10.010), available online 4 Nov. 2011.
36. Yinfeng Wang, Hao Liu, **Sheng Di** and Haoyu Hu, "A Parallel Index Mechanism for Large Scale High Dimensional Data," Journal of Huazhong University of Science and Technology (Nature Science Edition, 39(1), June 2011, in Chinese.

Publications - Refereed Conference Publications

37. Yafan Huang, **Sheng Di**, Guanpeng Li, Franck Cappello, "cuSZp2: A GPU Lossy Compressor with Extreme Throughput and Optimized Compression Ratio", IEEE/ACM The International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2024](#)), 2024
38. Yafan Huang, **Sheng Di**, Zhaorui Zhang, Xiaoyi Lu, Guanpeng Li, "Versatile Datapath Soft Error Detection on the Cheap for HPC Applications", IEEE/ACM The International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2024](#)), 2024
39. Jiajun Huang, **Sheng Di**, Xiaodong Yu, Zhaiyu Jia, Jinyang Liu, Zizhe Jian, Xin Liang, Kai Zhao, Xiaoyi Lu, Zizhong Chen, Franck Cappello, Yanfei Guo and Rajeev Thakur, "hZCC: Accelerating Collective Communication with Co-designed Operation-supported Compression", IEEE/ACM The International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2024](#)), 2024
40. Jinyang Liu, Jiannan Tian, Shixun Wu, **Sheng Di**, Boyuan Zhang, Robert Underwood, Yafan Huang, Jiajun Huang, Kai ZHao, Guanpeng Li, Dingwen Tao, Zizhong Chen, and Franck Cappello, "High-ratio Scientific Lossy Compression on GPUs with Optimized Multi-level Interpolation",

IEEE/ACM The International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2024](#)), 2024

41. Tri Nguyen, Md Hasanur Rahman, **Sheng Di** and Michela Becchi, "CAROL: Significantly Improving Fixed-Ratio Compression Framework for Resource-limited Applications", in 53rd International Conference on Parallel Processing ([ACM ICPP2024](#)), 2024
42. Jiajun Huang, **Sheng Di**, Xiaodong Yu, Zhaiyu Jia, Jinyang Liu, Yafan Huang, Ken Raffanetti, Hui Zhou, Kai Zhao, Xiaoyi Lu, Zizhong Chen, Franck Cappello, Yanfei Guo, Rajeev Thakur, "gZCCL: Compression-Accelerated Collective Communication Framework for GPU Clusters", 38th ACM International Conference on Supercomputing ([ACM ICS2024](#)), 2024
43. Haotian Xu, Zhaorui Zhang, **Sheng Di**, Benben Liu, Jiannong Cao, "FedFa: A Fully Asynchronous Training Paradigm for Federated Learning", International Joint Conferences on Artificial Intelligence ([IJCAI24](#)), 2024
44. Grant Wilkins, **Sheng Di**, Jon Calhoun, Zilinghan Li, Kibaek Kim, Robert Underwood, Richard Mortier and Franck Cappello, "FedSZ: Leveraging Floating-Point Lossy Compression for Federated Learning Communications", 44th IEEE International Conference on Distributed Computing Systems ([IEEE ICDCS2024](#))
45. Milan Shah, Xiaodong Yu, **Sheng Di**, Michela Becchi, Franck Cappello, "A Portable, Fast, DCT-based Compressor for AI Accelerators", in International Symposium on High-Performance Parallel and Distributed Computing ([ACM HPDC2024](#)), 2024
46. Shihui Song, Yafan Huang, Peng Jiang, Xiaodong Yu, Weijian Zheng, **Sheng Di**, Qinglei Cao, Yunhe Feng, Zhen Xie, Franck Cappello, "CereSZ: Enabling and Scaling Error-bounded Lossy Compression on Cerebras CS-2", in International Symposium on High-Performance Parallel and Distributed Computing ([ACM HPDC2024](#)), 2024
47. Md Hasanur Rahman, **Sheng Di**, Guanpeng Li, Franck Cappello, "A Generic and Efficient Framework for Estimating Lossy Compressibility of Scientific Data", in Proceedings of the 35th International Conference on Massive Storage Systems and Technology ([IEEE MSST2024](#)), 2024,
48. Zizhe Jian, **Sheng Di**, Jinyang Liu, Kai Zhao, Xin Liang, Haiying Xu, Robert Underwood, Jiajun Huang, Shixun Wu, Zizhong Chen, Franck Cappello, "CliZ: Optimizing Lossy Compression for Climate Datasets with Adaptive Fine-tuned Data Prediction", in Proceedings of the 38th IEEE International Parallel and Distributed Processing Symposium ([IPDPS2024](#))
49. Di Zhang, Monish Soundar Raj, Bing Xie, **Sheng Di**, Dong Dai, "Cross-System Analysis of Job Characterization and Scheduling in Large-Scale Computing Clusters", in Proceedings of the 38th IEEE International Parallel and Distributed Processing Symposium ([IPDPS2024](#))
50. Md Hasanur Rahman, **Sheng Di**, Shengjian Guo, Xiaoyi Lu, Guanpeng Li, Franck Cappello, "DRUTO: Upper-Bounding Silent Data Corruption Vulnerability in GPU Applications", in Proceedings of the 38th IEEE International Parallel and Distributed Processing Symposium ([IPDPS2024](#))
51. Jiajun Huang, **Sheng Di**, Xiaodong Yu, Yujia Zhai, Zhaorui Zhang, Jinyang Liu, Xiaoyi Lu, Ken Raffanetti, Hui Zhou, Kai Zhao, Zizhong Chen, Franck Cappello, Yanfei Guo, Rajeev Thakur, "An Optimized Error-controlled MPI Collective Framework Integrated with Lossy Compression", in Proceedings of the 38th IEEE International Parallel and Distributed Processing Symposium ([IPDPS2024](#))
52. Mingze Xia, **Sheng Di**, Franck Cappello, Pu Jiao, Kai Zhao, Jinyang Liu, Xuan Wu, Xin Liang, and Hanqi Guo, "Preserving Topological Feature with Sign-of-Determinant Predicates in Lossy Compression: A Case Study of Vector Field Critical Points", Proceedings of the 40th IEEE International Conference on Data Engineering ([ICDE2024](#)), Utrecht, Netherlands, May 13 - 16, 2024.
53. Jinyang Liu, **Sheng Di**, Kai Zhao, Xin Liang, Sian Jin, Zizhe Jian, Jiajun Huang, Shixun Wu, Zizhong Chen, Franck Cappello, "High-performance Effective Scientific Error-bounded Lossy Compression

with Auto-tuned Multi-component Interpolation", in ACM Special Interest Group on Management of Data ([SIGMOD2024](#)), 2024.

54. Sian Jin, **Sheng Di**, Frederic Vivien, Dance Wang, Yves Robert, Dingwen Tao, Franck Cappello, "Concealing Compression-accelerated I/O for HPC Applications through In Situ Task Scheduling", in [Eurosys2024](#), 2024.
55. Arham Khan, **Sheng Di**, Kai Zhao, Jinyang Liu, Kyle Chaid, Ian Foster, Franck Cappello, "SECRE: Surrogate-based Error-controlled Lossy Compression Ratio Estimation Framework", in 30th edition of the IEEE International Conference on High Performance Computing, Data, and Analytics ([HiPC2023](#)), 2023.
56. Pu Jiao, **Sheng Di**, Jinyang Liu, Xin Liang, Franck Cappello, "Characterization and Detection of Artifacts for Error-controlled Lossy Compressors", in 30th edition of the IEEE International Conference on High Performance Computing, Data, and Analytics ([HiPC2023](#)), 2023.
57. Arkaprabha Ganguli, Robert Underwood, Julie Bessac, David Krasowska, Jon Calhoun, **Sheng Di**, Franck Cappello, "A Lightweight, Effective Compressibility Estimation Method for Error-bounded Lossy Compression", in IEEE International Conference on Cluster Computing ([IEEE CLUSTER2023](#)), 2023. [acceptance rate: 24.6%]
58. Sian Jin, **Sheng Di**, Frédéric Vivien, Dance Wang, Yves Robert, Dingwen Tao, Franck Cappello, "Concealing Compression-accelerated I/O for HPC Applications through In Situ Task Scheduling", in [Eurosys 2024](#), 2024.
59. Daoce Wang, Jesus Pulido, Jesus Pulido, Jiannan Tian, Sian Jin, Houjun Tang, Jean Sexton, **Sheng Di**, Kai Zhao, Bo Fang, Zarija Lukic, Franck Cappello, James Ahrens, Dingwen Tao, "AMRIC: A Novel In Situ Lossy Compression Framework for Efficient I/O in Adaptive Mesh Refinement Applications", IEEE/ACM The International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2023](#)), 2023.
60. Yafan Huang, **Sheng Di**, Xiaodong Yu, Guanpeng Li, Franck Cappello, "CompX: An Ultra-fast GPU Error-bounded Lossy Compression Framework with Optimized End-to-End Performance", in IEEE/ACM The International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2023](#)), 2023.
61. Yuanjian Liu, Sheng Di, Kyle Chard, Ian Foster, Franck Cappello, "Optimizing Scientific Data Transfer on Globus with Error-bounded Lossy Compression", in 43rd IEEE International Conference on Distributed Computing Systems ([IEEE ICDCS2023](#)), 2023.
62. Jinyang Liu, Sheng Di, Kai Zhao, Xin Liang, Zizhong Chen, Franck Cappello, "FAZ: A flexible auto-tuned modular error-bounded compression framework for scientific data", in International Conference on Supercomputing ([ACM ICS2023](#)), 2023. (best paper nominated)
63. Milan Shah, Xiaodong Yu, Sheng Di, Michela Becchi, and Franck Cappello, "Lightweight Huffman Coding for Efficient GPU Compression", in International Conference on Supercomputing ([ACM ICS2023](#)), 2023. [acceptance rate: 29%]
64. Boyuan Zhang, Sheng Di, Xiaodong Yu, Martin Swamy, Dingwen Tao, Franck Cappello, "GPULZ: Optimizing LZSS Lossless Compression for Multi-byte Data on Modern GPUs", in International Conference on Supercomputing ([ACM ICS2023](#)), 2023. [acceptance rate: 29%]
65. Boyuan Zhang, Jiannan Tian, **Sheng Di**, Xiaodong Yu, Yunhe Feng, Yunhe Feng, Xin Liang, Dingwen Tao, Franck Cappello, "FZ-GPU: A Fast and High-Ratio Lossy Compressor for Scientific Computing Applications on GPUs," in 32nd International Symposium on High-Performance Parallel and Distributed Computing ([ACM HPDC2023](#)), 2023.
66. Khalid Ayedh Alharthi, Arshad Jhumka, **Sheng Di**, Lin Gui, Franck Cappello, Simon McIntosh, "Time Machine: Generative Real-Time Model For Failure (and Lead Time) Prediction in HPC Systems," in IEEE International Conference on Dependable Systems and Networks ([IEEE DSN2023](#)), 2023.

67. Yafan Huang, Kai Zhao, **Sheng Di**, Guanpeng Li, Maxim Dmitriev, Thierry-Laurent D. Tonellot and Franck Cappello, "Towards Improving Reverse Time Migration Performance by High-speed Lossy Compression," in 23rd IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing ([AMC CCGrid2023](#)), 2023.
68. Milan Shah, Xiaodong Yu, **Sheng Di**, Danylo Lykov, Yuri Alexeev, Michela Becchi, Franck Cappello, "GPU-Accelerated Error-Bounded Compression Framework for Quantum Circuit Simulations," in Proceedings of the 37th IEEE International Parallel and Distributed Processing Symposium ([IPDPS2023](#)), St. Petersburg, Florida, USA, May 15-June 19, 2023.
69. Jiao Pu, **Sheng Di**, Hanqi Guo, Kai Zhao, Jiannan Tian, Dingwen Tao, Xin Liang, Franck Cappello, "Toward Quantity-of-Interest Preserving Lossy Compression for Scientific Data," in 49th International Conference on Very Large Database ([VLDB 2023](#)), 2023, Canada.
70. Md Hasanur Rahman, **Sheng Di**, Kai Zhao, Robert Underwood, Guanpeng Li, Franck Cappello, "A Feature-Driven Fixed-Ratio Lossy Compression Framework for Real-World Scientific Datasets," in Proceedings of the 39th IEEE International Conference on Data Engineering ([ICDE2023](#)), 2023.
71. Zhaoyuan Su, **Sheng Di**, Ali Murat Gok, Yue Cheng, Franck Cappello, "Understanding Impact of Lossy Compression on Derivative-related Metrics in Scientific Datasets," in Proceedings of the 7th International Workshop on Data Reduction for Big Scientific Data ([DRBSD-8](#)), in conjunction with IEEE/ACM The International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2022](#)), 2022.
72. Robert Underwood, Julie Bessac, **Sheng Di**, Franck Cappello, "Understanding the Effects of Modern Compressors on the Community Earth Science Model," in Proceedings of the 8th International Workshop on Data Reduction for Big Scientific Data ([DRBSD-8](#)), in conjunction with IEEE/ACM The International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2022](#)), 2022. **best paper award**
73. Maxim Dmitriev, Thierry Tonellot, Hussain Salim, **Sheng Di**, "Error-bounded lossy compression in Reverse Time Migration," in Sixth EAGE High Performance Computing Workshop ([EAGE22](#)), 2022.
74. Griffin Dube, Jiannan Tian, **Sheng Di**, Dingwen Tao, Jon C. Calhoun, Franck Cappello, "Efficient Error-Bounded Lossy Compression for CPU Architectures," in 30th International Symposium on the Modeling, Analysis, and Simulation of Computer and Telecommunication Systems ([IEEE MASCOTS 2022](#)), Nice, France, 2022.
75. Ruiwen Shan, **Sheng Di**, Jon C. Calhoun, Franck Cappello, "Exploring Light-weight Cryptography for Efficient and Secure Lossy Data Compression," in [IEEE CLUSTER2022](#), 2022.
76. Yafan Huang, Shengjian Guo, **Sheng Di**, Guanpeng Li, Franck Cappello, "Mitigating Silent Data Corruptions in HPC Applications across Multiple Program Inputs," in IEEE/ACM International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2022](#)), 2022. **best paper finalist**
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- Dingwen Tao and **Sheng Di**. "Collaborative Research: HyLoC: Objective-driven Adaptive Hybrid Lossy Compression Framework for Extreme-Scale Scientific Applications," in Fifth ACSIC Symposium on Frontiers in Computing ([SOFC 2022](#)), null, August 5, 2022-August 6, 2022.
- Yafan Huang, Shengjian Guo, **Sheng Di**, Guanpeng Li, Franck Cappello, "Hardening Selective Protection across Multiple Program Inputs for HPC Applications," in Principles and Practice of Parallel Programming ([PPoPP2022](#)), 2022.
- Xin-Chuan Wu, **Sheng Di**, Franck Cappello, Hal Finkel, Yuri Alexeev, Frederic T. Chong, "Full State Quantum Circuits Simulation by Using Data Compression," in IEEE/ACM 29th International Conference for High Performance Computing, Networking, Storage and Analysis ([IEEE/ACM SC2018](#)).
- Sihuan Li, **Sheng Di**, Xin Liang, Zizhong Chen, Franck Cappello, "Improving Error-bounded Compression for Cosmological Simulation,"in IEEE/ACM 29th International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2018](#)).
- **Sheng Di**, Dingwen Tao, Hanqi Guo, Zizhong Chen, Franck Cappello, "Towards Efficient Error-controlled Lossy Compression for Scientific Data," in Greater Chicago Area Systems Research Workshop ([GCASR17](#)), 2017.
- Ali Murat Gok, Dingwen Tao, **Sheng Di**, Vladimir Mironov, Yuri Alexeev, Franck Cappello, "PaSTRI: A Novel Data Compression Algorithm for Two-Electron Integrals in Quantum Chemistry," in IEEE/ACM 29th International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2017](#)).

- Xuanhua Shi, Junling Liang, **Sheng Di**, Bingsheng He, Hai Jin, Lu Lu, Zhixiang Wang, Xuan Luo, and Jianlong Zhong, "Optimization of Asynchronous Graph Processing on GPU with Hybrid Coloring Model," in 20th ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming ([PPoPP2015](#)), 2015.
- **Sheng Di**, Eduardo Berrocal, Leonardo Bautista-Gomez¹, Katherine Heisey, Rinku Gupta¹, Franck Cappello, "Towards Effective Detection of Silent Data Corruptions for HPC Applications," in IEEE/ACM 26th International Conference for High Performance computing, Networking, Storage and Analysis ([IEEE/ACM SC2014](#)), 2014.

Reports

- 2011, Aug. 22-23, **Final-check Report** for HKU-Grid project, on behalf of System Research Group of The University of Hong Kong, Beijing (Peking), China.
- 2011, Jan. 12-13, **Stage Report** of the development progress for HKU-Grid project, on behalf of System Research Group of The University of Hong Kong, Beijing (Peking), China.
- 2010, July. 29-Aug. 1, **Stage Report** of the development progress for HKU-Grid, on behalf of System Research Group of The University of Hong Kong, at Xilinhot, Inter Mongolia, China.
- 2008, Dec.18-20, **Stage Report** of development progress for HKU-Grid project, on behalf of System Research Group of The University of Hong Kong, at Shanghai, China.
- 2008, July 24-25, **Stage Report** of the development progress for HKU-Grid project, on behalf of System Research Group of The University of Hong Kong, at Wuxi, Jiangsu, China.
- 2008, June 22-25, **Stage Report** of the development progress for HKU-Grid project, on behalf of System Research Group of The University of Hong Kong, at Beijing (Peking), China.
- 2007, July 24-25, **Stage Report** of the development progress for HKU-Grid project, on behalf of System Research Group of The University of Hong Kong, at Beijing (Peking), China.

Invited Presentations/Talks

- 2024, July 22, CoDAC Correct Data Compression workshop, Montreal, Canada.
- 2024, April 16th, Joint Laboratory for Extreme-Scale Computing (JLESC) workshop, Japan.
- 2023, March 02, SIAM Conference on Computational Science and Engineering (CSE23), Netherlands.
- 2023, Feb 15, 'Compression for Scientific Applications', BOF session on ECP Annual meeting, Virtual meeting.
- 2023, Feb 07, 'New stories about Lossy Compression for Scientific Datasets', CS Seminar Series, MCS Division, Argonne National Laboratory.
- 2022, Dec 16, 'Compression session' of 13th Joint Laboratory for Extreme-Scale Computing (JLESC) workshop, Virtual meeting.
- 2022, Jan. White paper presentation "Boosting Scientific Data Access with Usage-Driven Lossy Compression." ASCR Workshop on the Management and Storage of Scientific Data.
- 2022, 04/15. 'Breakout session on data reduction for ECP Applications' section in ECP annual meeting.
- 2022, 09/29. 'Compression session' of 14th Joint Laboratory for Extreme-Scale Computing (JLESC) workshop, NCSA.
- 2022, 08/30. "Scalable Dynamic Scientific Data Reduction," DOE Computer Graphics Forum (DOECGF 2022).
- 2021, April, 'Lossy Data Reduction for ECP Applications' session in ECP annual meeting, Virtual meeting.

- 2021, April, 'ECP Community BOF: Tools for Data-driven Analysis and Improvement of HPC Scientific Software Development,' Virtual meeting.
- 2021, Feb., Joint Laboratory for Extreme-Scale Computing (JLESC) workshop, Virtual meeting.
- 2019, Nov. Tutorial speaker in Compression for Scientific Data at Supercomputing (SC19), 2019, Denver, CO.
- 2019, Oct, Invited talk at Illinois Institute of Technology (IIT), Chicago, USA.
- 2019, Oct, Invited talk at Wayne State University (WSU), Detroit, USA.
- 2019, April, t Joint Laboratory for Extreme Scale Computing (JLESC) workshop, Tennessee, Knoxville, TN.
- 2019, March, ECP CODAR all-hands meeting in ORN, TN.
- 2019, March, ECP Exasky all-hands meeting in Santa Fe, NM.
- 2018, June 18-20, 13th Scheduling for Large Scale Systems workshop, Berkeley, CA.
- 2017, July, Joint Laboratory for Extreme-Scale Computing (JLESC) workshop, Champaign, USA.
- 2016, Dec., I Joint Laboratory for Extreme-Scale Computing (JLESC) workshop, Kobe, Japan.
- 2016, Nov. Youth Workshop, Kobe, Japan.
- 2016, Sept. 15, Fault Tolerant Systems workshop, in conjunction with IEEE CLUSTER conference, Taipei, Taiwan.
- 2013, Nov. 25-27, 10th Workshop of the INRIA-Illinois Joint Laboratory on Petascale Computing, UIUC, USA.
- 2013, June 12-14, 9th Workshop of the INRIA-Illinois Joint Laboratory on Petascale Computing, Lyon, France.
- 2012, Nov. 19-22, Google (Mountain View, California), USA.

Seminars and Colloquia

- 2024, May 29, Stevens Institute of Technology (SIT), New Jersey, USA.
- 2016, June, Huazhong University of Science and Technology, Wuhan, China.
- 2016, May 5, Hubei University of Technology, Wuhan, China.
- 2016, March, Los Alamos National Laboratory (LANL), Los Alamos, CA.
- 2014, November 25, 2nd Joint Lab of Extreme-Scale Computing ([JLESC](#)) Workshop, Chicago, IL.
- 2014, May 8, Argonne National Laboratory, Lemont, IL.
- 2014, April 2, University of California – Merced, Merced, CA.
- 2014, Feb. 11, Huazhong University of Science and Technology, Wuhan, China.
- 2014, Jan. 24, Shenzhen Institutes of Advanced Technology, Shenzhen, China.
- 2014, Jan. 23, The University of Hong Kong, Hong Kong, China.

Other Presentations: Talks

- 2019: IEEE MSST2019, IEEE DSN2019
- 2018: DRBSD-4
- 2016: IEEE IPDPS2016, DRBSD-2
- 2014: IEEE IPDPS2014, IEEE/ACM SC20142013: IEEE ICPP2013, IEEE CLOUD2013, IEEE/ACM IWQoS2013, IEEE/ACM SC2013, IEEE/ACM HiPC2013
- 2012: IEEE CLUSTER2012, IEEE/ACM SC2012

- 2011: IEEE ICPP2011, IEEE CSC2011
- 2010: IEEE/ACM Grid2010, IEEE ICPP2010
- 2009: CNGridAnnual2009, HPCAsia -27th APAN
- 2007: PAKDD2007
- 2006: [IEEE APSCC2006](#)

Editorial Board of Journal

- Editorial Board Member, Frontiers in High Performance Computing Journal.
- Review Board Member, Transactions on Parallel and Distributed Systems (TPDS)

Organization of Conferences/Workshops

- **Review Committee Board Member:** DOE-SBIR-STTR FOA, 2024.
- **Organizing Committee Member:** International Workshop on Data Analysis and Reduction for Big Scientific Data (DRBSD-10), in conjunction with SC2024, 2024.
- **Research ACM SRC Poster Member:** IEEE/ACM International Conference for High Performance computing, Networking, Storage and Analysis (SC2024), 2024.
- **Program Committee Member:** IEEE International Conference on High Performance Computing , Data, and Analytics ([IEEE HiPC2024](#)), 2024.
- **Program Committee Member:** IEEE/ACM International Parallel & Distributed Processing Symposium (IPDPS24), 2024.
- **Program Co-chair:** 4th International Workshop on Big Data Reduction (IWBDR2023), in conjunction with IEEE Bigdata conference, 2023.
- **Steering Committee Member:** International Workshop on Data Analysis and Reduction for Big Scientific Data (DRBSD-9), in conjunction with SC2023, 2023.
- **Program Committee Member:** ACM High Performance Parallel and Distributed Computing (HPDC2023), 2023.
- **Review Committee Board Member:** DOE Data Visualization FOA, 2022.
- **Program Committee Member:** IEEE/ACM International Conference for High Performance computing, Networking, Storage and Analysis (SC2022), 2022.
- **Program Co-chair:** 3rd International Workshop on Big Data Reduction (IWBDR2022), in conjunction with IEEE Bigdata conference, 2022.
- **Program Chair:** International Workshop on Data Analysis and Reduction for Big Scientific Data (DRBSD-8), in conjunction with SC2022.
- **Program Committee Member:** 51st International Conference on Parallel Processing (ICPP2022), 2022.
- **Review Committee Board Member:** DOE Early Career Research Program (ECRP), 2022.
- **Program Committee Member:** 36th IEEE International Parallel and Distributed Processing Symposium (IPDPS 2022), 2022.
- **Program Co-chair:** 2nd International Workshop on Big Data Reduction (IWBDR2021), in conjunction with IEEE Bigdata conference, 2021.
- **Program Committee Member:** IEEE Special Section on Parallel and Distributed Computing Techniques for AI, ML, and DL (IEEE TPDS-SS-AI 2021), 2021.
- **Program Committee Member:** IEEE 2021 International Conference on Machine Learning and Applications (IEEE ICMLA2021), 2021.

- **Program Committee Member:** IEEE International Conference on Big Data (IEEE Bigdata2021), 2021.
- **Program Committee Member:** 18th IEEE Workshop on Silicon Errors in Logic -- System Effects (SELSE2021), 2021.
- **Program Committee Member:** IEEE Transactions on Parallel and Distributed Systems ([IEEE TPDS](#)) Special Section on Parallel and Distributed Computing Techniques for AI, ML and DL ([IEEE TPDS-SS-AI 2020](#)).
- **Program Committee Member:** International Workshop on Data Analysis and Reduction for Big Scientific Data ([DRBSD-5](#)), in conjunction with [SC2020](#).
- **Program Committee Member:** IEEE International Conference on High Performance Computing, Data, and Analytics ([IEEE HiPC2020](#)), 2020.
- **Program Committee Member (Data, Storage, and Visualization track and poster section):** IEEE International Conference on Cluster Computing ([IEEE CLUSTER-2020](#)), 2020
- **Program Committee Member:** IEEE Asia-Pacific Services Computing Conference ([APSCC 2019](#)), 2019.
- **Program Committee Member:** IEEE Congress on [BigData](#), 2019.
- **Program Committee Member:** IEEE International Conf. on SmartData ([SmartData](#)), 2019.
- **Program Committee Member:** IEEE Asia-Pacific Services Computing Conference ([APSCC 2018](#)), 2018.
- **Track Chair/Program Committee Member:** IEEE [BigData](#) Congress, USA, July, 2018.
- **Program Committee Member** [poster session]: IEEE/ACM International Conference for High Performance Computing, Networking, Storage and Analysis ([SC'18](#)), 2018.
- **Program Committee Member:** 32nd IEEE International Parallel and Distributed Processing Symposium ([IPDPS'18](#)), 2018.
- **Program Committee Member:** 18th IEEE/ACM International Symposium of Cluster, Cloud and Grid Computing ([CCGrid'17](#)), 2017.
- **Program Committee Member:** IEEE Workshop on Fault Tolerant Systems ([FTS 2017](#)), in conjunction with IEEE CLUSTER 2017.
- **Program Committee Member:** IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing ([CCGrid17](#)), 2017.
- **Program Chair:** IEEE Workshop on Fault Tolerant Systems ([FTS 2016](#)), in conjunction with IEEE CLUSTER 2016.
- **Program Committee Member:** IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing ([CCGrid16](#)), 2016.
- **Program Committee Member:** IEEE fourth International Workshop on Cloud Computing Interclouds, Multiclouds, Federations, and Interoperability (IEEE [Intercloud'15](#))
- **Organizing Chair:** Postdoc-Ph.D-Student Session at [JLESC Workshop](#), Chicago, November 24-26th, 2014.
- **Program Committee Member:** 5th International Conference on Scalable Information Systems ([Infoscale2014](#)), Seoul, South Korea, 2014.
- **Program Committee Member:** Asia-Pacific Services Computing Conference ([APSCC-2014](#)), 2014.
- **Program Committee Member:** 6th IEEE International Conference on Cloud Computing Technology and Science ([CloudCom-2014](#)), 2014.
- **Program Committee Member:** International Workshop on Mobile Internet Big Data, Wuhan, 2014.

- **Program Committee Member:** IEEE International Workshop on Advanced Technologies of Cloud Computing, [IWATCC14](#), 2014.
- **Program Committee Member:** IEEE International Conference on Services Computing ([SCC-2014](#)), 2014.
- **Program Committee Member:** IEEE Third International Workshop on Cloud Computing Interclouds, Multiclouds, Federations, and Interoperability (IEEE [Intercloud'14](#)).
- **Program Committee Member:** The 8th International Conference on Complex, Intelligent, and Software Intensive Systems ([CISIS 2014](#)), Birmingham, UK.
- **Program Committee Member:** The 5th IEEE International Conference on Cloud Computing Technology and Science ([CloudCom-2013](#)).
- **Program Committee Member:** The 27th IEEE International Conference on Advanced Information Networking and Applications ([AINA-2013](#)).
- **Program Committee Member:** The 4th IEEE International Conference on Cloud Computing Technology and Science ([CloudCom-2012](#)).
- **Program Committee Member:** IEEE Asia Pacific Cloud Computing Conference, 2012 ([APCloud-2012](#)).
- **Local Organizing Committee member:** [PRAGRMA Conference 2011](#).
- **Local Organizing Committee member:** The 6th [OMII-CNGrid Training 2008](#).

Patent

- Hai Jin, Pingpeng Yuan, Li Huang, Feng Mao, **Sheng Di**, Sheng Sun, Shilun Yuan, Changqin Li, Yanxia Li, Qin Shi: "Grid Data Transmission Platform with High QoS and Multi-replica," [NO. 200610125570.9](#), 2006 (in Chinese).

Major Software (all available to download for free)

- **MMD-SZ** (Core Developer): Error-bounded lossy compressor customized for molecular dynamics datasets. <https://github.com/szcompressor/MMD-SZ>
- **Interp-SZ** (Core Developer): Interpolation-based error-bounded lossy compressor. <https://github.com/szcompressor/SZ3>
- **SZx** (Core developer): Ultra-fast error-bounded lossy compressor. <https://github.com/szcompressor/SZx>
- **Libpressio** (Co-developer): <https://github.com/robertu94/libpressio>
- **QCAT** (Core Developer): Quick Compression Analysis Toolkit. <https://github.com/szcompressor/qcat>
- **cuSZp** (Co-developer): <https://github.com/szcompressor/cuSZp>
- **FZ-GPU** (Co-developer) A Fast and High-Ratio Lossy Compressor for Scientific Data on GPUs: <https://github.com/szcompressor/FZ-GPU>
- **kSZ** (Co-developer): Kokkos-based error-bounded lossy compressor for scientific data. <https://github.com/szcompressor/kokkosSZ>
- **cuSZ** (Co-developer): CUDA-Based Error-bounded lossy compressor for scientific data. <https://github.com/szcompressor/cuSZ/>
- **SZ** (Core Developer): Error-bounded high-performance computing in situ data compressor. <http://github.com/szcompressor/SZ>
- **H5Z-SZ** (Core Developer): HDF5 filter for SZ compressor. <https://github.com/disheng222/H5Z-SZ>
- **PnetCDF-SZ** (Core Developer): Integration of SZ compression into PnetCDF.

<https://github.com/Parallel-NetCDF/PnetCDF-SZ>

- **GloudSim** (Core Developer): Google trace-based cloud simulator with virtual machines <https://code.google.com/p/gloudsim/> (source code has been moved to <https://github.com/nThanksForAllTheFish/gloudsim>).
- **Z-checker** (Core Developer): Exascale scientific data analysis library with lossy compression <https://github.com/CODARcode/Z-checker>
- **Z-checker-installer** (Core Developer): One-command installation for Z-checker and all dependencies. <https://github.com/CODARcode/z-checker-installer>
- **AID** (Core developer): Adaptive Impact-driven detector (for detecting SDC on HPC environment) <https://collab.cels.anl.gov/display/ESR/AID>
- **LogAider** (Core developer): Tool for mining potential correlations in HPC system logs <https://github.com/disheng222/LogAider>

Selected Projects

- **DOE ZF**, A novel framework to design trustworthy lossy compressors for scientific data approaching lossy compressibility limits, 2024-2027.
- **DOE ASCR SR-APFFL**, Distributed resilience project: Scalable and Resilient Modeling for Federated-Learning-Based Complex Workflows, 2023~2028, \$4.35M.
- **NSF FZ**, Collaborative Research: Frameworks: FZ: A fine-tunable cyberinfrastructure framework to streamline specialized lossy compression development (PI: Franck Cappello), 2023-2028, \$3.14M
- **DOE ASCR Data Reduction**, 2021-2024, co-PI: Automatic Generation of Algorithms for High-Speed Reliable Lossy Compression.
- **NSF CSSI ROCCI**, 2021-2024, PI: Elements: ROCCI: Integrated Cyberinfrastructure for In Situ Lossy Compression Optimization Based on Post Hoc Analysis Requirements, \$320K.
- **DOE ASCR SDR (Early Career Research Program Award)**, 2021-2026, PI: Scalable Dynamic Scientific Data Reduction: \$2.5M.
- **NSF CDS&E HyLoC**, 2020-2023, PI: Objective-driven Adaptive Hybrid Lossy Compression Framework for Extreme-Scale Scientific Application, \$300K.
- **ECP VeloC-SZ (DOE project)**, 2019-2023: Senior personnel, research and technical lead and key developer. Very-Low Overhead Checkpointing System and Error-bounded Lossy Compression for Scientific HPC Datasets.
- **ECP Exasky (DOE project)**, 2016–2023: Senior personnel, key developer of compression modules. Exploring a set of very efficient compression techniques for Cosmology simulation.
- **ECP EZ (DOE project)**, 2016–2019, Technical lead and key developer: Development of an effective, efficient, generic lossy compressor for significantly reducing the scientific data for scientists.
- **ECP CODAR (DOE project)**, 2016–2019: Senior personnel, research and technical lead and developer. Exploration of the characteristics of the data regarding data compression, and developing methodologies and tools (software) to assess the lossy compression error and its impact on application data.
- **Catalog Project (DOE project)**, 2015–2019, Core developer of the related analysis software (LogAider) and key researcher on the system log analysis: In-depth characterization and analysis of the errors, failures and faults for large-scale (or exascale) supercomputing environments.
- **ALETHEIA**, 2016-2019, Co-PI: Exploration of how to design and implement end-to-end SDC detection when scientific applications are compressing their datasets with lossy compressors and storing the result on storage systems.

- **PARIS:** Data-knowledge based Extreme-Scale Resilience, 2013–2016: Key developer. I explored fundamental properties of numerical science applications to improve the resilience of extreme-scale executions and to provide efficient solutions to system failures and silent data corruptions.
- **AMFT Project,** 2012–2015: Key developer. I exploited new check-pointing technologies (Fault Tolerant Interface, FTI) and Multilevel Fault Tolerance (MFT) in combination with different storage levels and technologies, in the context of resilience of HPC.
- **Predicting Idleness of Data Centers,** 2012–2013 (Google Research Award): I built a model to predict workload/hostload for Google data centers.
- **Cloud@HOME,** 2012–2013 (funded by the national French science foundation for running complex services over unreliable Internet resources) optimized and stabilized a best-suited queuing policy and a virtual resource allocation scheme.
- **Desktop Cloud / Self-organizing Cloud,** 2010–2011 (supported by Hong Kong grants): I developed a set of core optimization algorithms with fully distributed resource discovery protocols.
- **CNGrid,** 2007–2011 (key national project under the High-Tech R&D Program in China): I was mainly in charge of the construction and development of HKU-Grid Point, one of the key Grid points along with other nine ones.
- **SemREX,** 2006–2008 (funded by China-973 Project of National Basic Research and Development Plan): I co-designed and co-developed the relationship-searching engine.
- **CGSV (ChinaGrid SuperVision),** 2005–2006 (Sponsored by HP Inc. providing real-time monitoring support for ChinaGrid): I helped design its whole architecture, developing a graphic user interface and archive module.
- **GPE4CGSP(Sponsored by Intel),** 2006: I analyzed the code of GPE and developed a middleware to integrate the Information Center of CGSP and that of GPE, supported by a GUI as well.
- **CGSP(ChinaGrid Supported Platform),** 2005–2006 (the biggest grid project in China): I devised a GUI to display its key information, such as jobs, applications, and services and provided web service interfaces with Geo-Information System support and security support..
- **CoGIS,** 2004–2005: I integrated it with the GlobalWatch system and installed and administered Globus, GridFTP, and debugging a Dynamic Replica Transmission platform.
- **GlobalWatch (a distributed monitoring system),** 2004–2005: I developed the server and client software with another developer.

Mentoring/Co-mentoring

- 02/2024-present: Longtao Zhang, Ph.D student from Florida State University.
- 02/2024-present: Congrong Ren, Ph.D student from Ohio State University.
- 05/2024-present: Xuan Wu, Ph.D student from University of Kentucky.
- 05/2024-present: Ammar Ahmed, Ph.D student from University of Minnesota.
- 01/01/2024-present: Khondoker Mumenin, Ph.D student from University of North Carolina at Charlotte.
- 2023-present: Boyuan Zhang, Ph.D student from Indiana University.
- 05/2024-present: Harvey Dam, Ph.D student from University of Utah.
- 2023-present: Alexandra Poulos, Ph.D student from Clemson University.
- 2023-present: Shihui Song, Ph.D student from University of Iowa.
- 2023-present: Shan Huang, Ph.D student from Stevens Institute of Technology.
- 2023-present: Weijin Liu, Ph.D student from Stevens Institute of Technology.

- 2023-present: Mingze Xia, Ph.D student from University of Kentucky
- 01/01/2023-12/31/2023: Di Zhang, Ph.D student from University of North Carolina at Charlotte.
- 06/2021-present: Yuanjian Liu, Ph.D student from University of Chicago
- 07/01/2023-present: Grant Wilkins, Ph.D student from Clemson University.
- 09/01/2023-present: Ning Yan, Ph.D student from Georgia State University.
- 07/01/2023-present: Darren Ng, Ph.D student from University of California, Merced.
- 06/01/2023-present: Tripti Agarwal, Ph.D student from University of Utah.
- 06/01/2023-present: Tri Nguyen, Ph.D student from NC State University.
- 01/01/2023-present: Zizhe Jian, Ph.D student from University of California, Riverside.
- 10/01/2022-present: Pu Jiao, Ph.D student from University of Kentucky.
- 10/01/2022-present: David Krasowska, Ph.D student from Clemson University.
- 10/01/2022-present: Arkaprabha Ganguli, Ph.D student from Clemson University..
- 10/01/2022-present: Milan Shah, Ph.D student from NC State University.
- 10/01/2022-present: Jiajun Huang, Ph.D student from University of California, Riverside.
- 10/01/2022-present: Baixi Sun, Ph.D student from Indiana University.
- 10/01/2022-present: Arham Khan, Ph.D student from University of Chicago.
- 09/01/2021-present: Md Hasanur Rahman, Ph.D student from University of Iowa
- 07/01/2021-present: Yafan Huang, Ph.D student from University of Iowa.
- 06/2020~2024: Jinyang Liu, Ph.D student from University of California, Riverside.
- 03/2020~2023: Khalid Alharthi, Ph.D student from The University of Warwick, UK.
- 08/2019~2024: Jiannan Tian, Ph.D student from Washington State University.
- 01/2021~2024: Sian Jin, Ph.D student from Washington State University.
- 06/15/2022-10/01/2022: Zhaoyuan Su, Ph.D student from George Mason University.
- 07/01/2021-10/01/2022: Ruiwen Shan, Ph.D student from Clemson University.
- 06/01/2020-10/01/2022: Cody Rivera, Bachelor's degree student from University of Alabama.
- 05/2020-10/2021, Griffin Dube, Ph.D student from Clemson University.
- 06/2020-06/2021: Zhiheng Chen, Bachelor student from University of California San Diego.
- 06/2019~2022: Robert Underwood, PhD student from Clemson University.
- 06/2019~08/2022: Kai Zhao, Ph.D student from University of California, Riverside.
- 06/2019~12/2019: Tasmia Reza, Ph.D student from Clemson University.
- 06/2017~2019: XinChuan (Ryan) Wu, Ph.D student from University of Chicago.
- 06/2017~05/2021: Sihuan Li, Ph.D student from University of California, Riverside.
- 02/2017~01/2020: Xin Liang, Ph.D student from University of California, Riverside.
- 05/2017~03/2021: Ali M. Gok, Ph.D student at Northwestern University, Chicago.
- 06~09/2016: Dingwen Tao, Ph.D student at University of California, Riverside.
- 2015: Omer Subasi, Ph.D .student at Barcelona Supercomputing Center (BSC), Spain.
- 2015: Eduardo Berrocal, Ph.D student, Illinois Institute of Technology (IIT).
- 2013: Haibao Chen, Ph.D student, Huazhong University of Science and Technology (HUST), China.
- 2012~2013: Xinhou Wang, Ph.D student, Huazhong University of Science and Technology (HUST), China.

- 2010–2011: Hao Liu, Master's degree student at The University of Hong Kong, China.
- 2009–2011: Zheming Xu, Master's degree student at The University of Hong Kong, China.

Teaching Assistant, HKU

- 2010–2011: Principles of Operating Systems
- 2008–2009: Principles of Operating Systems
- 2007–2008: Java-Based Object-Oriented Programming .

Invited External Reviewer

- IEEE Transaction on Computers (TC), 2008.
- Journal of Parallel Distributed and Computing (JPDC 2008), 2008.
- IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing (CCGrid09), 2009.
- High Performance Computing Asia (HPCAsia09), 2009.
- IEEE International Conference on Cluster Computing (IEEE Cluster09), 2009.
- International Conference on Parallel and Distributed Computing (ICPADS09), 2009.
- IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing (CCGrid10), 2010.
- IEEE 4th International Conference on Cloud Computing (Cloud10), 2010.
- Journal of Computer Science and Technology (JCST), 2010.
- Heterogeneity in Computing Workshop (HCW10) in conjunction with IEEE/ACM IPDPS10, 2010.
- CNGrid Annual Conference 2009/2010/2011
- IEEE/ACM International Parallel & Distributed Processing Symposium (IPDPS11), 2011.
- International Conference on Parallel Processing (ICPP11), 2011.
- Heterogeneity in Computing Workshop (HCW11) in conjunction with IPDPS11, 2011.
- International Conference on Services Computing (SCC11), 2011.
- Cloud Computing (CloudCom11), 2011.
- International Journal of Computational Science and Engineering, 2012.
- International Journal of Scientific Research and Essays, 2012.
- IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing (CCGrid13), 2013.
- International Journal of Automated Software Engineering (ASE), 2013.
- International Journal of Peer-to-Peer Networking and Applications (PPNA), 2013.
- International Conference on Networking and Grid Cloud Computing (ICNGCC-2013).
- International Journal of Future Generation Computer Systems (FGCS), 2013.
- KSII Transactions on Internet and Information Systems (TIIS), 2013.
- Journal of Zhejiang University, 2013.
- IEEE Transactions on Parallel and Distributed Systems (TPDS), 2013.
- IEEE/ACM International Parallel & Distributed Processing Symposium (IPDPS13), 2013.
- IEEE Transactions on Cloud Computing (TCC), 2013.
- IEEE/ACM International Parallel & Distributed Processing Symposium (IPDPS14), 2014.
- KSII Transactions on Internet and Information Systems (TIIS), 2014.
- IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing (CCGrid14)

- Journal of Computer Science and Technology (JCST), 2014.
- IEEE Transactions on Cloud Computing (TCC), 2014.
- IEEE/ACM The International Conference for High Performance computing, Networking, Storage and Analysis (SC2014), 2014.
- IEEE Transactions on Parallel and Distributed Systems (TPDS), 2014.
- International Journal of Future Generation Computer Systems (FGCS), 2014
- IEEE/ACM International Parallel & Distributed Processing Symposium (IPDPS15), 2015.
- IEEE Transactions on Cloud Computing (TCC2015), 2015.
- Journal of Mathematical Problems in Engineering (MPE), 2015.
- IEEE International Workshop on Cloud Computing Interclouds, Multiclouds, Federations, and Interoperability (Intercloud 2015), 2015.
- elsevier Journal of Systems and Software (JSS), 2015.
- International ACM Symposium on High Performance Parallel and Distributed Computing (HPDC15), 2015.
- International Journal of Future Generation Computer Systems (FGCS), 2015.
- International Conference on Cluster Computing (IEEE CLUSTER-2015), 2015.
- IEEE Systems Journal (SJ), 2015.
- Journal of Software: Practice and Experience (SPE), 2015.
- Journal of Parallel Distributed and Computing (JPDC), 2015.
- The Computer Journal, 2015.
- The 12th Annual IFIP International Conference on Network and Parallel Computing (NPC15), 2015.
- IEEE Transactions on Parallel and Distributed Systems (TPDS), 2015.
- International Conference on Cloud Computing and Big Data (CCBD), 2015.
- IEEE Transactions on Services Computing (TSC), 2015.
- Journal of Knowledge based Systems (KBS), 2015.
- IEEE International Parallel and Distributed Processing Symposium (IPDPS'16), 2016.
- IEEE/ACM International Symposium of Cluster, Cloud and Grid Computing (CCGrid'16), 2016.
- IEEE International Symposium on ACM High Performance Parallel and Distributed Computing (HPDC'16), 2016.
- IEEE Transactions on Parallel and Distributed Systems (TPDS), 2016.
- ACM International Conference on Supercomputing (ICS'16), 2016.
- elsevier Journal of Parallel Computing (PARCO), 2016
- IIS. Journal of Information Science and Engineering, 2016.
- International Parallel and Distributed Processing Symposium (IPDPS17), 2017.
- IEEE/ACM International Symposium of Cluster, Cloud and Grid Computing (CCGrid'17), 2017.
- IEEE Transactions on Services Computing (TSC'17), 2017.
- International Conference on Cluster Computing (IEEE CLUSTER-2017), 2017.
- IEEE Transactions on Parallel and Distributed Systems (TPDS), 2017.
- The International Journal of High Performance Computing Applications (IJHPCA), 2017
- International Workshop of Fault Tolerant Systems (FTS17), 2017.
- IEEE Transactions on Parallel and Distributed Systems (TPDS), 2018.

- Elsevier Computer Physics Communications (CPC), 2018.
- Future Generation System Computing (FGCS), 2018.
- Journal of Supercomputing, 2018.
- IEEE congress on BigData, 2018.
- IEEE Cluster conference [poster], 2018.
- International Conference on Parallel Processing (ICPP18), 2018.
- Journal of Concurrency and Computation: Practice and Experience (CCPE), 2018.
- LNCS Asia-Pacific Services Computing Conference (APSCC2018), 2018.
- IEEE International Conference on Cluster Computing (IEEE CLUSTER-2019), 2019.
- ACM Transactions on Parallel Computing (TOPC), 2019
- IEEE Transactions on Parallel and Distributed Systems (TPDS), 2019.
- IEEE congress on BigData, 2019.
- ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC), 2019.
- IEEE International Conference on Smart Data (SmartData-2019), 2019.
- International Conference on Parallel Processing (ICPP2019), 2019.
- Springer Peer-to-Peer Networking and Applications (PPNA2019, 2019).
- SIAM Journal on Scientific Computing, 2019.
- Springer Peer-to-Peer Networking and Applications (PPNA2020), 2020.
- International Journal of Electrical Power & Energy Systems (IJEPE), 2020.
- IEEE Transactions on Parallel and Distributed Systems (TPDS), regular track, 2020.
- IEEE Transactions on Parallel and Distributed Systems (TPDS), special section on Parallel and Distributed Computing Techniques for AI, ML and DL, 2020.
- IEEE International Conference on Cluster Computing (IEEE CLUSTER-2020), 2020.
- International Conference on High Performance Computing (IEEE/ACM HiPC 2020).
- ACM Computing Surveys (CSUR), 2020.
- IEEE SmartDataService conference, 2020.
- IEEE Transactions on Smart Grid, 2020.
- Journal of Mathematical Problems in Engineering (MPE), 2020.
- Journal of Information Sciences, 2021.
- IEEE Transactions on Cloud Computing (TCC), 2021.
- IEEE Transactions on Parallel and Distributed Systems (TPDS), 2021.
- The International Journal of High Performance Computing Applications (IJHPCA), 2021.
- IEEE Special Section on Parallel and Distributed Computing Techniques for AI, ML, and DL (IEEE TPDS-SS-AI 2021), 2021.
- IEEE 2021 International Conference on Machine Learning and Applications (IEEE ICMLA2021), 2021.
- Journal of Concurrency and Computation: Practice and Experience (CCPE), 2022.
- Best paper nominated: 40th International Conference on Parallel Processing (IEEE ICPP), 2022.
- International Journal of High Performance Computing Applications (IJHPCA), 2022.
- IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing (CCGrid22), 2022.
- Journal of Computational Science (JOCSCI), 2022.

- IEEE/ACM International Parallel & Distributed Processing Symposium (IPDPS22), 2022.
- IEEE Transactions on Parallel and Distributed Systems (TPDS), 2022.
- IEEE Visualization (IEEE Vis) 2023.
- Frontier in High Performance Computing (Journal), 2023.
- Transactions on Parallel and Distributed Systems (IEEE TPDS) journal (5 papers), 2023.
- IEEE Transactions on Visualization and Computer Graphics (IEEE TVCG2023) (2 papers), 2023.
- Kansas NSF EPSCoR, (NSF proposal), 2024
- Journal of Parallel Distributed Computing (JPDC), 2024.
- Future Generation Computer Systems (FGCS), 2024.
- IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGrid), 2024.
- IEEE/ACM International Parallel & Distributed Processing Symposium (IPDPS24), 2024.