

Yue Cheng

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Research Interests

Distributed systems, cloud computing, serverless computing, high-performance computing, storage systems, operating systems, data compression, machine learning (ML) systems

The overarching goal of my research is to enable practical, efficient, and easy-to-use computer systems for the growing data demands of modern high-end applications running on existing as well as emerging computing platforms. My current research focuses on: (1) designing efficient stateful serverless computing systems using a full-stack approach spanning application frameworks, platforms, operating systems, and hardware; (2) building scalable and efficient data-intensive computing systems (e.g., ML systems) and (3) utilizing ML approaches to improve the computing and storage systems.

Professional Experience and Employment

- 08/2023–present **Associate Professor**, *University of Virginia*, Charlottesville, VA.
School of Data Science and SEAS Department of Computer Science
- 08/2022–08/2023 **Assistant Professor**, *University of Virginia*, Charlottesville, VA.
School of Data Science and SEAS Department of Computer Science
- 08/2017–08/2022 **Assistant Professor**, *George Mason University*, Fairfax, VA.
Department of Computer Science
- 2011–2017 **Research/Teaching Assistant**, *Virginia Tech*, Blacksburg, VA.
Department of Computer Science
- 06/2015–12/2015 **Research Intern**, *EMC*, Princeton, NJ.
Offline flash caching
- 05/2014–08/2014 **Research Intern**, *IBM Research–Almaden*, San Jose, CA.
Cloud analytics storage tiering
- 05/2013–08/2013 **Research Intern**, *IBM Research–Almaden*, San Jose, CA.
Load balanced in-memory caching

Education

- 2011–2017 **Virginia Polytechnic Institute and State University (Virginia Tech)**, *Blacksburg, VA*.
Ph.D. in Computer Science
- 2005–2009 **Beijing University of Posts and Telecommunications (BUPT)**, *Beijing, China*.
B.Eng. in Computer Science

Honors & Awards

- 2023 **Outstanding Researcher Award**, for achievements in research at the University of Virginia
- 2023 **Samsung Global Research Outreach Award**, Samsung Advanced Institute of Technology and Samsung Memory Solutions Lab
- 2022 **IEEE CS TCHPC Early Career Researchers Award for Excellence in High Performance Computing** (*One of the most prestigious awards for junior researchers in HPC*)
- 2022 **Meta Research Award** of the Meta AI System Hardware/Software Codesign Competition

- 2022 **Best Student Paper Award Finalist** of The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC 2022): *5 out of 81 accepted papers*
- 2022 **Outstanding Teacher Award** of the Computer Science Department at George Mason University
- 2022 **Award Finalist** of Facebook (Meta) Mathematical Modeling & Optimization for Large-Scale Distributed Systems Award Competition
- 2021 **NSF CAREER Award** for the project titled “CAREER: Harnessing Serverless Functions to Build Highly Elastic Cloud Storage Infrastructure”
- 2020 **Amazon Research Award** for the project titled “Distributed Large-scale Graph Deep Learning by Gradient-free Optimization”
- 2012–2015 **Student Travel Grant:** USENIX ATC’15, ACM HPDC’15, EuroSys’15, USENIX OSDI’14, USENIX FAST’14, ACM SoCC’13, USENIX OSDI’12
- 2014 **Pratt Fellowship (Best Teaching Assistant Award)** awarded by Computer Science at Virginia Tech
- 2006–2009 **University Scholarship** awarded by Beijing University of Posts and Telecommunications, China

Publication

A: Students for whom I serve as the advisor; M: Students I mentor.

Refereed Conferences and Workshops

★: Tier-1 venue.

Systems ATC’24, SIGMETRICS’24, ASPLOS’23, FAST’23, FAST’20, FAST’18, ATC’21, ATC’16, SoCC’21, SoCC’20, EuroSys’15

HPC SC’22, SC’21, SC’18, HPDC’20, HPDC’16, HPDC’15

DB & ML VLDB’24 ×2, VLDB’23

[VLDB ’24]★ **Everything You Always Wanted to Know About Storage Compressibility of Pre-Trained ML Models but Were Afraid to Ask.**

50th International Conference on Very Large Data Bases (*VLDB’24*), (*To appear*).
Zhaoyuan SuA, Ammar Ahmed, Zirui WangA, Ali Anwar, **Yue Cheng**.

[VLDB ’24]★ **Algorithmic Complexity Attacks for Dynamic Learned Indexes.**

50th International Conference on Very Large Data Bases (*VLDB’24*), (*To appear*).
Rui YangA, Evgenios M. Kornaropoulos, **Yue Cheng**.

[ATC ’24]★ **ALPS: An Adaptive Learning, Priority OS Scheduler for Serverless Functions.**

2024 USENIX Annual Technical Conference (*ATC’24*), (AR: 77/488 = 15.8%).
Yuqi FuA, Ruizhe ShiM, Haoliang Wang, Songqing Chen, **Yue Cheng**.

[SIGMETRICS ’24]★ **A Closer Look into IPFS: Accessibility, Content, and Performance.**

ACM SIGMETRICS / IFIP Performance (*SIGMETRICS’24*), (AR: 54/338 = 16%).
Ruizhe ShiM, Ruizhi Cheng, Bo Han, **Yue Cheng**, Songqing Chen.

[BigData ’23] **Towards Cost-effective and Resource-aware Aggregation at Edge for Federated Learning.**

2023 IEEE International Conference on Big Data (*BigData’23*), (AR: 92/526 = 17.5%).
Ahmad Khan, Yuze Li, Xinran Wang, Sabaat Haroon, Haider Ali, **Yue Cheng**, Ali R. Butt, Ali Anwar.

[ASPLOS ’23]★ **λFS: A Scalable and Elastic Distributed File System Metadata Service using Serverless Functions.**

ACM Conference on Architectural Support for Programming Languages and Operating Systems (*ASPLOS’23*), (AR: 50/238 = 21%).

Benjamin CarverA, Runzhou Han, Jingyuan ZhangA, Mai Zheng, **Yue Cheng**.

- [VLDB '23]★ **InfiniStore: Elastic Serverless Cloud Storage.**
49th International Conference on Very Large Data Bases (*VLDB'23*).
Jingyuan Zhang^A, Ao Wang^A, Xiaolong Ma, Benjamin Carver^A, Nicholas John Newman^A, Ali Anwar, Vasily Tarasov, Lukas Rupperecht, Dimitrios Skourtis, Feng Yan, **Yue Cheng**.
- [FAST '23]★ **SHADE: Enable Fundamental Cacheability for Distributed Deep Learning Training.**
USENIX Conference on File and Storage Techniques (*FAST'23*), (AR: 28/123 = 22.8%).
Redwan Ibne Seraj Khan^M, Ahmad Hossein Yazdani^M, Yuqi Fu^A, Arnab K. Paul, Bo Ji, Xun Jian, **Yue Cheng**, Ali R. Butt.
- [SC '22]★ **SFS: Smarter OS Scheduling for Serverless Functions.**
The International Conference for High Performance Computing, Networking, Storage, and Analysis (*SC'22 – Best Student Paper Award Finalist*), (AR: 81/320 = 25.3%).
Yuqi Fu^A, Li Liu^M, Haoliang Wang, **Yue Cheng**, Songqing Chen.
- [SoCC '21]★ **Mind the Gap: Broken Promises of CPU Reservations in Containerized Multi-tenant Clouds.**
ACM Symposium on Cloud Computing (*SoCC'21*), (AR: 46/145 = 31.7%).
Li Liu^M, Haoliang Wang, An Wang, Mengbai Xiao, **Yue Cheng**, Songqing Chen.
- [SC '21]★ **FedAT: A High-Performance and Communication-Efficient Federated Learning System with Asynchronous Tiers.**
The International Conference for High Performance Computing, Networking, Storage, and Analysis (*SC'21*), (AR: 86/365 = 23.6%).
Zheng Chai^A, Yujing Chen, Ali Anwar, Liang Zhao, **Yue Cheng**, Huzefa Rangwala.
- [ATC '21]★ **FaaSNet: Scalable and Fast Provisioning of Custom Serverless Container Runtimes at Alibaba Cloud Function Compute.**
2021 USENIX Annual Technical Conference (*ATC'21*), (AR: 64/341 = 18.8%).
Ao Wang^A, Shuai Chang, Huangshi Tian, Hongqi Wang, Haoran Yang, Huiba Li, Rui Du, **Yue Cheng**.
- [OPT '21] **Community-based Layerwise Distributed Training of Graph Convolutional Networks.**
NeurIPS 2021 Workshop on Optimization for Machine Learning (*OPT'21*).
Hongyi Li, Junxiang Wang, Yongchao Wang, **Yue Cheng**, Liang Zhao.
- [ICDM '20] **Toward Model Parallelism for Deep Neural Network based on Gradient-free ADMM Framework.**
20th IEEE International Conference on Data Mining (*ICDM'20*), (AR: 91/930 = 9.8%).
Junxiang Wang, Zheng Chai^A, **Yue Cheng**, Liang Zhao.
- [SoCC '20]★ **Wukong: A Scalable and Locality-Enhanced Framework for Serverless Parallel Computing.**
ACM Symposium on Cloud Computing (*SoCC'20*), (AR: 35/143 = 24.5%).
Benjamin Carver^A, Jingyuan Zhang^A, Ao Wang^A, Ali Anwar, Panruo Wu, **Yue Cheng**.
- [ICML WS '20] **Tunable Subnetwork Splitting for Model-parallelism of Neural Network Training.**
ICML 2020 Workshop on Beyond First-Order Methods in ML systems (*ICML WS'20*).
Junxiang Wang, Zheng Chai^A, **Yue Cheng**, Liang Zhao.
- [HPDC '20]★ **TiFL: A Tier-based Federated Learning System.**
ACM Symposium on High-Performance Parallel and Distributed Computing (*HPDC'20*), (AR: 16/71 = 22.5%).
Zheng Chai^A, Ahsan Ali, Syed Zawad, Ali Anwar, Stacey Truex, Nathalie Baracaldo, Yi Zhou, Heiko Ludwig, Feng Yan, **Yue Cheng**.
- [FAST '20]★ **InfiniCache: Exploiting Ephemeral Serverless Functions to Build a Cost-Effective Memory Cache.**
USENIX Conference on File and Storage Techniques (*FAST'20*), (AR: 23/138 = 16.7%).
Ao Wang^A, Jingyuan Zhang^A, Xiaolong Ma, Ali Anwar, Vasily Tarasov, Lukas Rupperecht, Dimitrios Skourtis, Feng Yan, **Yue Cheng**.

- [PDSW '19] **In Search of a Fast and Efficient Serverless DAG Engine.**
The 4th International Parallel Data Systems Workshop (*PDSW'19*).
Benjamin Carver^A, Jingyuan Zhang^A, Ao Wang^A, **Yue Cheng**.
- [Cloud '19] **Bolt: Towards a Scalable Docker Registry.**
The IEEE International Conference on Cloud Computing (*Cloud'19*), (AR: 20.8%).
Michael Littley, Ali Anwar, Hannan Fayyaz^M, Zeshan Fayyaz^M, Vasily Tarasov, Lukas Rupprecht, Dimitrios Skourtis, Mohamed Mohamed, Heiko Ludwig, **Yue Cheng**, Ali R. Butt.
- [OpML '19] **Towards Taming the Resource and Data Heterogeneity in Federated Learning.**
2019 USENIX Conference on Operational Machine Learning (*OpML'19*), (AR: 16/30 = 53.3%).
Zheng Chai^A, Hannan Fayyaz^M, Zeshan Fayyaz^M, Ali Anwar, Yi Zhou, Nathalie Baracaldo, Heiko Ludwig, **Yue Cheng**.
- [VEE '19] **vCPU as a Container: Towards Accurate CPU Allocation for VMs.**
The 15th ACM SIGPLAN/SIGOPS International Conference on Virtual Execution Environments (*VEE'19*), (AR: 15/33 = 45.5%).
Li Liu^M, Haoliang Wang, An Wang, Mengbai Xiao, **Yue Cheng**, Songqing Chen.
- [BigData '18] **Analyzing Alibaba's Co-located Datacenter Workloads.**
IEEE International Conference on Big Data (*BigData'18*), (AR: 38.8%).
Yue Cheng, Ali Anwar, Xuejing Duan.
- [SC '18]★ **BespoKV: Application Tailored Scale-Out Key-Value Stores.**
The International Conference for High Performance Computing, Networking, Storage, and Analysis (*SC'18*), (AR: 68/288 = 23.6%).
Ali Anwar, **Yue Cheng**, Hai Huang, Jingoo Han, Hyogi Sim, Dongyoon Lee, Fred Douglass, and Ali R. Butt.
- [APSys '18] **Characterizing Co-located Datacenter Workloads: An Alibaba Case Study.**
The 9th ACM SIGOPS Asia-Pacific Workshop on Systems (*APSys'18*), (AR: 21/50 = 42%).
Yue Cheng, Zheng Chai*, Ali Anwar.
- [IPDPS '18] **Chameleon: An Adaptive Wear Balancer for Flash Clusters.**
IEEE International Parallel & Distributed Processing Symposium (*IPDPS'18*), (AR: 113/461 = 24.5%).
Nannan Zhao, Ali Anwar, **Yue Cheng**, Mohammed Salman, Daping Li, Jiguang Wan, Changsheng Xie, Xubin He, Feiyi Wang, and Ali R. Butt.
- [FAST '18]★ **Improving Docker Registry Design based on Production Workload Analysis.**
USENIX Conference on File and Storage Techniques (*FAST'18*), (AR: 23/140 = 16.4%).
Ali Anwar, Mohamed Mohamed, Vasily Tarasov, Michael Littley, Lukas Rupprecht, **Yue Cheng**, Nannan Zhao, Dimitrios Skourtis, Amit S. Warke, Heiko Ludwig, Dean Hildebrand, Ali R. Butt.
- [ATC '16]★ **Erasing Belady's Limitations: In Search of Flash Cache Offline Optimality.**
The 2016 USENIX Annual Technical Conference (*ATC'16*), (AR: 47/266 = 17.7%).
Yue Cheng, Fred Douglass, Philip Shilane, Michael Trachtman, Grant Wallace, Peter Desnoyers, and Kai Li.
- [HotStorage '16] **ClusterOn: Building Highly Configurable and Reusable Clustered Data Services using Simple Data Nodes.**
The 8th USENIX Workshop on Hot Topics in Storage and File Systems (*HotStorage'16*), (AR: 24/65 = 36.9%).
Ali Anwar, **Yue Cheng**, Hai Huang, and Ali R. Butt.
- [HPDC '16]★ **MOS: Workload-aware Elasticity for Cloud Object Stores.**
The 25th ACM Symposium on High-Performance Parallel and Distributed Computing (*HPDC'16*), (AR: 20/129 = 15.5%).
Ali Anwar, **Yue Cheng**, Aayush Gupta, and Ali R. Butt.

- [VarSys '16] **Towards Managing Variability in the Cloud.**
The 1st IEEE International Workshop on Variability in Parallel and Distributed Systems ([VarSys'16](#)).
Ali Anwar, **Yue Cheng**, and Ali R. Butt.
- [PDSW '15] **Taming the Cloud Object Stores with MOS.**
The 10th ACM Parallel Data Storage Workshop ([PDSW'15](#)), (AR: 9/25 = 36%).
Ali Anwar, **Yue Cheng**, Aayush Gupta, and Ali R. Butt.
- [HotCloud '15] **Pricing Games for Hybrid Object Stores in the Cloud: Provider vs. Tenant.**
The 7th USENIX Workshop on Hot Topics in Cloud Computing ([HotCloud'15](#)), (AR: 21/64 = 32.8%).
Yue Cheng, M. Safdar Iqbal, Aayush Gupta, and Ali R. Butt.
- [HPDC '15]★ **Cast: Tiering Storage for Data Analytics in the Cloud.**
The 24th ACM Symposium on High-Performance Parallel and Distributed Computing ([HPDC'15](#)), (AR: 19/116 = 16.4%).
Yue Cheng, M. Safdar Iqbal, Aayush Gupta, and Ali R. Butt.
- [EuroSys '15]★ **An In-Memory Object Caching Framework with Adaptive Load Balancing.**
The 10th ACM European Conference on Computer Systems ([EuroSys'15](#)), (AR: 32/154 = 20.8%).
Yue Cheng, Aayush Gupta, and Ali R. Butt.

Technical Reports

- [VT technical report] **MOANA: Modeling and Analyzing I/O Variability in Parallel System Experimental Design.**
Kirk Cameron, Ali Anwar, **Yue Cheng**, Li Xu, Bo Li, Uday Ananth, Yili Hong, Layne T. Watson, and Ali R. Butt.

Posters and Demos

- [NSDI '19] **HyperFaaS: A Truly Elastic Serverless Computing Framework.**
USENIX Symposium on Networked Systems Design and Implementation ([NSDI'19](#)), (Poster).
Jingyuan Zhang*, Ao Wang*, Min Li, Yuan Chen, **Yue Cheng**.
- [APSys '15] **Taming the Cloud Object Stores with MOS.**
The 6th ACM SIGOPS Asia-Pacific Workshop on Systems ([APSys'15](#)), (Poster).
Ali Anwar, **Yue Cheng**, Aayush Gupta, and Ali R. Butt.
- [SoCC '13] **High Performance In-Memory Caching through Flexible Fine-Grained Services.**
2013 ACM Symposium on Cloud Computing ([SoCC'13](#)), (Poster).
Yue Cheng, Aayush Gupta, Anna Povzner, and Ali R. Butt.

Book Chapters

- [Book chapter] **SDN helps Big Data to optimize storage.**
Big Data and Software Defined Networks, editor: Javid Taheri. IET, ISBN 978-1-78561-304-3. 2018.
Ali R. Butt, Ali Anwar, and **Yue Cheng**.

Refereed Journals

- [TNNLS] **Community-based Distributed Training of Graph Convolutional Networks via ADMM.**
IEEE Transactions on Neural Networks and Learning Systems ([TNNLS](#)) (*Under review*).
Hongyi Li, Junxiang Wang, Yongchao Wang, **Yue Cheng**, Liang Zhao.
- [TNNLS] **Towards Quantized Model Parallelism for Graph-Augmented MLPs Based on Gradient-Free ADMM Framework.**
IEEE Transactions on Neural Networks and Learning Systems ([TNNLS](#)).
Junxiang Wang, Hongyi Li, Zheng Chai^A, Yongchao Wang, **Yue Cheng**, Liang Zhao.

- [TPDS] **Customizable Scale-Out Key-Value Stores.**
IEEE Transactions on Parallel and Distributed Systems (*TPDS*), Volume: 31, Issue: 9, Pages: 2081-2096, Apr. 25 2020, (Impact Factor = 3.402).
Ali Anwar, **Yue Cheng**, Hai Huang, Jingoo Han, Hyogi Sim, Dongyoon Lee, Fred Douglass, Ali R. Butt.
- [TPDS] **MOANA: Modeling and Analyzing I/O Variability in Parallel System Experimental Design.**
IEEE Transactions on Parallel and Distributed Systems (*TPDS*), Volume: 30, Issue: 8, Pages: 1843-1856, Aug. 1 2019, (Impact Factor = 3.402).
Kirk Cameron, Ali Anwar, **Yue Cheng**, Li Xu, Bo Li, Uday Ananth, Yili Hong, Layne T. Watson, and Ali R. Butt.
- [Internet Computing] **Provider versus Tenant Pricing Games for Hybrid Object Stores in the Cloud.**
IEEE Internet Computing's special issue on Cloud Storage: May/June 2016, Pages: 28-35, vol. 20.
Yue Cheng, M. Safdar Iqbal, Aayush Gupta, and Ali R. Butt.

Research Funding

8 NSF grants, 8 industry awards/gifts (Samsung, Adobe, Meta, and Amazon), 1 4-VA initiatives project, 7 time allocation cloud credit awards, and 1 hardware donation.
Total funding amount: around \$5.9 M; Total personal share: around \$2.4 M.

- NSF: OAC-2411009 **"Elements: A Sustainable, Resource-Efficient Cyberinfrastructure for Notebook Interactive ML Training Workloads"**. Grant amount: \$600,000; My personal share: \$300,000 (50% share); PI: Yue Cheng (UVA); Co-PI: Geoffrey Fox (UVA); Duration: 09/15/2024–8/31/2027.
- NSF: OAC-2403313 **"Collaborative Research: OAC Core: Distributed Graph Learning Cyberinfrastructure for Large-scale Spatiotemporal Prediction"**. Grant amount: \$599,547; My personal share: \$299,973 (50% share); PI: Yue Cheng (UVA); Duration: 10/01/2024–9/30/2027.
- NSF: SMA-2349503 **"REU Site: The Data Justice Academy"**. Grant amount: \$481,232; PI: Claudia Scholz (UVA); Co-PI: Yue Cheng (UVA); Duration: 09/01/2024–8/31/2027.
- Samsung GRO **"Highly Efficient Pre-Trained LLM Storage with Near-Storage Compression and CXL Memory Integration"**. Total: \$250,000; My personal share: \$125,000; Role: PI: Yue Cheng (UVA), Co-PI: Ali Anwar (UMN); Duration: 04/2024–03/2025.
- Adobe Gift **"Serverless GPU and Storage Management for Large-scale, Interactive Machine Learning Training Workloads"**. Total: \$25,000; My personal share: \$25,000; Role: PI: Yue Cheng (UVA); Duration: 02/2024–present.
- Adobe Gift **"Serverless GPU and Storage Management for Large-scale, Interactive Machine Learning Training Workloads"**. Total: \$20,000; My personal share: \$20,000; Role: PI: Yue Cheng (UVA); Duration: 06/2023–present.
- 4-VA Collaborative Grant **"Near-Data Processing for Machine Learning Workloads Acceleration"**. Total: \$35,000; My personal share: \$5,000; Role: PI: Huaicheng Li (VT); Co-PI: Yue Cheng (UVA); Duration: 05/2023–present.
- Meta Research Awards **"Serverless and Scalable GNN Training with Disaggregated Compute and Storage"**. Total: \$50,000; My personal share: \$25,000; Role: PI: Yue Cheng (UVA); Co-PI: Liang Zhao (Emory); Duration: 09/2022–08/2023.
- Hardware **Western Digital Zoned Namespaces SSDs**. Two 4TB Western Digital ZN540 SSDs; Role: PI: Yue Cheng (UVA).
- Adobe Gift **"Serverless GPU and Storage Management for Large-scale, Interactive Machine Learning Training Workloads"**. Total: \$30,000; My personal share: \$30,000; Role: PI: Yue Cheng (UVA); Duration: 05/2022–present.

- Adobe Gift **“Serverless GPU and Storage Management for Large-scale, Interactive Machine Learning Training Workloads”**. Total: \$10,000; My personal share: \$10,000; PI: Yue Cheng (UVA); Duration: 09/2021–present.
- NSF: CMMI-2134689 **“FMSG: Cyber: Federated Deep Learning for Future Ubiquitous Distributed Additive Manufacturing”**. Grant amount: \$498,762; My personal share: \$189,949 (38% share); PI: Jia Liu (Auburn); Co-PI: Yue Cheng (UVA); Duration: 10/01/2021–9/30/2023.
- Adobe Gift **“Achieving Predictable Performance for FaaS Workloads via OS-Transparent Serverless Function Scheduling”**. Total: \$10,000; My personal share: \$10,000; PI: Yue Cheng (UVA); Duration: 03/2021–present
- NSF: CNS-2045680 **“CAREER: Harnessing Serverless Functions to Build Highly Elastic Cloud Storage Infrastructure”**. Grant amount: \$572,897 + \$16,000 REU; My personal share: \$572,897 + \$16,000 REU (100% share); PI: Yue Cheng (UVA); Duration: 02/15/2021–02/14/2026.
- Amazon Research Award **“Distributed Large-scale Graph Deep Learning by Gradient-free Optimization”**. Grant amount: \$75,000; My personal share: \$37,500; PI: Liang Zhao (Emory); Co-PI: Yue Cheng (UVA); Duration: 11/01/2020–10/31/2022.
- NSF: MRI-2018631 **“MRI: Acquisition of an Adaptive Computing Infrastructure to Support Compute- and Data-Intensive Multidisciplinary Research”**. Grant amount: \$750,000; PI: Elise Miller-Hooks (GMU); Co-PIs: Jayshree Sarma, Yue Cheng, Shobita Satyapal, Maria Emelianenko (GMU); Involved in designing Hopper, GMU’s next-generation on-campus HPC Infrastructure; Duration: 08/01/2020–7/31/2023.
- NSF: OAC-2007976 **“OAC Core: SMALL: DeepJIMU: Model-Parallelism Infrastructure for Large-scale Deep Learning by Gradient-Free Optimization”**. Grant amount: \$498,609; My personal share: \$249,302 (50% share); PI: Liang Zhao (Emory); Co-PI: Yue Cheng (UVA); Duration: 10/01/2020–9/30/2023.
- NSF: CCF-1919075 **“SPX: Collaborative Research: Cross-stack Memory Optimizations for Boosting I/O Performance of Deep Learning HPC Applications”**. Grant amount: \$1,273,487; UVA share: \$320,603 (25% share); Role: PI: Yue Cheng (UVA); Duration: 10/01/2019–9/30/2023.

Time Allocation Grants

- NSF CloudBank **“CAREER: Harnessing Serverless Functions to Build Highly Elastic Cloud Storage Infrastructure”**. Total: \$35,480 AWS credit; PI: Yue Cheng (UVA); Duration: 07/21/2022–06/30/2024.
- Google Cloud Platform **“Towards a GPU-efficient Serverless Notebook Platform”**. Total: \$5,000; PI: Yue Cheng (UVA); Duration: 01/08/2024–01/07/2025.
- IBM Cloud **“InfiniStore: Elastic Serverless Cloud Storage”**. Total: \$4,000; PI: Yue Cheng (UVA); Duration: 12/30/2020–12/29/2021.
- Google Cloud Platform **“Building a Purely Serverless Parallel Computing Framework”**. Total: \$5,000; PI: Yue Cheng (UVA); Duration: 08/10/2020–08/09/2021.
- Amazon Web Services **“LambDAG: A Lambda-aware DAG Engine”**. Total: \$36,000; PI: Yue Cheng (UVA); Duration: 10/01/2019–10/31/2020.
- Google Cloud Platform **“Building a Generic Serverless DAG Engine”**. Total: \$10,000; PI: Yue Cheng (UVA); Duration: 08/20/2019–02/19/2020.
- Google Cloud Platform **“Towards Serverless Computational Science”**. Total: \$5,000; PI: Yue Cheng (UVA); Duration: 10/01/2018–07/31/2019.
- Amazon Web Services **“Building a Virtual Serverless Cloud OS”**. Total: \$36,000; PI: Yue Cheng (UVA); Duration: 08/01/2018–07/31/2019.

Talks

- 2024 **Everything You Always Wanted to Know About Storage Compressibility of Pre-Trained ML Models but Were Afraid to Ask**
Invited talk: 50th International Conference on Very Large Data Bases (VLDB 2024), Guangzhou, China (08/2024)
- 2024 **Algorithmic Complexity Attacks on Dynamic Learned Indexes**
Invited talk: 50th International Conference on Very Large Data Bases (VLDB 2024), Guangzhou, China (08/2024)
- 2024 **Stateful Computing in a Serverless Way**
Invited talk: McDaniel College, MD (05/2024)
- 2023 **SHADE: Enable Fundamental Cacheability for Distributed Deep Learning Training**
Invited talk: The GenAI and ML Systems Efficiency Workshop, Adobe Research, virtual (10/2023)
- 2023 **Stateful Computing in a Serverless Way**
Invited talk: The University of Edinburgh, Scotland, virtual (04/2023)
- 2022 **Computing in a Serverless Way for Fun and Profit**
Invited talk: Virginia Tech Northern Virginia Center, Falls Church, VA (10/2022)
- 2022 **Scaling Data Analytics on Serverless Clouds**
Invited talk: McDaniel College, MD (03/2022)
- 2018 **Analyzing Alibaba's Co-located Datacenter Workloads**
Conference talk: IEEE BigData 2018, Seattle, WA (12/2018)
- 2018 **The hardware, they are a-changin**
Breakout summary talk: Workshop on Data Storage Research 2025, San Jose, CA (05/2018)
- 2018 **Breaking the Monolith: Rethinking Storage System Design**
Invited talk: Virginia Tech Northern Virginia Center, Falls Church, VA (03/2018)
- 2018 **Erasing Belady's Limitations: In Search of Flash Cache Offline Optimality**
Invited talk: HPDC'18 TPC Workshop, Berkeley, CA (03/2018)
- 2017 **Breaking the Monolith: Rethinking Storage System Design**
George Mason University, Fairfax, VA (11/2017)
George Mason University, Fairfax, VA (04/2017)
- 2016 **Erasing Belady's Limitations: In Search of Flash Cache Offline Optimality**
Conference talk: USENIX ATC'16, Denver, CO (06/2016)
Internship talk: The CTO Office of EMC CTD, Princeton, NJ (06/2016)
- 2015 **Pricing Games for Hybrid Object Stores in the Cloud: Provider vs. Tenant**
Conference talk: USENIX HotCloud'15, Santa Clara, CA (06/2015)
The CTO Office of EMC CTD, Princeton, NJ (05/2015)
- 2015 **CAST: Tiering Storage for Data Analytics in the Cloud**
Conference talk: ACM HPDC'15, Portland, OR (06/2015)
- 2015 **An In-Memory Object Caching Framework with Adaptive Load Balancing**
Conference talk: ACM EuroSys'15, Bordeaux, France (04/2015)
- 2014 **An In-Memory Object Caching Framework with Adaptive Load Balancing**
Internship talk: IBM Almaden Research Center, San Jose, CA (08/2014)
- 2013 **High Performance, Flexible Memory Caching**
Internship talk: IBM Almaden Research Center, San Jose, CA (08/2013)

Teaching

At University of Virginia

- Fall 2024 **CS4740 Cloud Computing**
Enrollment: 77
- Spring 2024 **CS/DS5110 Big Data Systems**
Enrollment: 97
- Spring 2023 **DS5110 Big Data Systems**
Enrollment: 64

At George Mason University

- Spring 2022 **CS571 Operating Systems**
Enrollment: 23, —Overall instructor rating and course rating cancelled starting Spring 2022—
- Fall 2021 **CS475 Concurrent & Distributed Systems**
Enrollment: 58, Instructor rating: 4.36/5, course rating: 4.16/5
- Spring 2021 **CS571 Operating Systems**
Enrollment: 18, Instructor rating: 4.93/5, course rating: 4.64/5
- Fall 2020 **Teaching leave**
- Spring 2020 **CS675 Distributed Systems**
Enrollment: 9 (formal teaching evaluation cancelled due to COVID-19)
- Spring 2020 **CS571 Operating Systems**
Enrollment: 34 (formal teaching evaluation cancelled due to COVID-19)
- Fall 2019 **CS471 Operating Systems**
Enrollment: 68, Instructor rating: 4.33/5, Course rating: 3.98/5
- Spring 2019 **CS471 Operating Systems**
Enrollment: 66, Instructor rating: 4.63/5, Course rating: 4.06/5
- Fall 2018 **CS795 Cloud Computing**
Enrollment: 8, Instructor rating: 4.88/5, Course rating: 4.88/5
- Fall 2017 **CS471 Operating Systems**
Enrollment: 59, Instructor rating: 2.94/5, Course rating: 2.81/5

Student Advising

PhD Dissertation Advisor

1. Zheng Chai, PhD, CS@UVA, *8 papers published, 1 paper under review*, started 2018, expected to graduate Fall 2023
Topic: Distributed machine learning systems
Internships:
 - HPE, Summer 2021.
2. Jingyuan Zhang, PhD, CS@GMU, *3 papers published*, started 2018
Topic: Stateful serverless computing
Internships:
 - ByteDance, Summer 2022.
 - Adobe Research, Summer 2021.
 - NetApp, Summer 2020.
3. Ao Wang, PhD, CS@GMU, *4 papers published*, started 2018
Topic: Efficient serverless infrastructure
Internships:
 - Alibaba Cloud, Summer 2020.

4. Yuqi Fu, PhD, CS@UVA, *1 paper published* started 2020
Topic: Serverless resource scheduling
Internships:
 - ByteDance, Summer 2022.
5. Benjamin Carver, PhD, CS@GMU, *2 papers published*, started 2021
Topic: Stateful serverless computing
Internships:
 - Microsoft Research, Summer 2022.
6. Zhaoyuan (Alex) Su, PhD, CS@UVA, *1 paper published*, started 2021
Topic: Algorithmic and systems support for large-scale federated learning
Internships:
 - Argonne National Laboratory, Summer 2022.
7. Rui Yang, PhD, CS@UVA, started 2021
Topic: Learned data storage systems

Master Research

1. Benjamin Carver, Accelerated BS/MS Program@GMU, *2 papers published*
Topic: Designing a Serverless Data Analytics Framework
2. Rafael Madrid MS, CS,
Topic: Designing NVM Storage for Serverless Workloads
3. Anne Martine Augustin (MS, SWE, Spring'19–Summer'19)

Undergraduate Research

Shengming Gao, CS@UVA
 Michael Somarriba, CS@GMU
 Daniel Meneses, CS@GMU
 Yuanqi Du, CS@GMU
 Benjamin Carver, CS@GMU
 Isaiah King, CS@GMU
 Dawen Yang, CS@GMU
 Mark Boehen, ECE@GMU
 Hannan Fayyaz, CS, York University, Canada
 Zeshan Fayyaz, CS, Ryerson University, Canada

PhD Dissertation Committee Member

Redwan Ibne Seraj Khan, PhD, CS@VT
 Samuel S. Ogden, PhD, CS@WPI
 Hengrun Zhang, PhD, CS@GMU
 Li Liu, PhD, CS@GMU
 Robert Lorentz, PhD, ECE@GMU

Open-source Software

INFINICACHE: <https://github.com/ds2-lab/infinicache>
 INFINISTORE: <https://github.com/ds2-lab/infinistore>
 ΛFS: <https://github.com/ds2-lab/LambdaFS>
 WUKONG: <https://github.com/ds2-lab/Wukong>
 FAASNET: <https://github.com/ds2-lab/FaaSNet>
 SFS: <https://github.com/ds2-lab/SFS>

ALPS: <https://github.com/ds2-lab/ALPS>

ELF: <https://github.com/ds2-lab/ELF>

Algorithmic complexity attacks for dynamic learned indexes: <https://github.com/ds2-lab/aca-dlis>

BESPOKV: <https://github.com/tddg/bspokv>

SHADE: <https://github.com/R-I-S-Khan/SHADE>

Professional Services

University, College, and Department Service

- 2024 Faculty search committee, School of Data Science, UVA
- 2024 Ph.D. admissions committee, Computer Science, UVA
- 2021–2022 Faculty search committee, Computer Science, GMU
- 2017–2019 Computer Science Ph.D. admissions committee, GMU

Conference Organizer and Community Services

- 2025 **ICDCS**, Cloud Computing Track TPC Chair, IEEE International Conference on Distributed Computing Systems
- 2024 **HotStorage**, General co-chair, ACM Workshop on Hot Topics in Storage and File Systems
- 2023 **HotStorage**, Publication chair, ACM Workshop on Hot Topics in Storage and File Systems
- 2023 **HPDC**, Workshop co-chair, ACM International Symposium on High-Performance Parallel and Distributed Computing
- 2022 **HotStorage**, Publication chair, ACM Workshop on Hot Topics in Storage and File Systems
- 2021–present **IEEE STCOS**, Co-chair, IEEE Special Technical Community on Operating Systems
- 2021 **ICDCS**, Local arrangement chair, IEEE International Conference on Distributed Computing Systems
- 2019 **SEC**, Local arrangement chair, ACM/IEEE Symposium on Edge Computing

Journal Editorship

- 2024–present Topic Editor for Frontiers in Computer Science: Serverless Computing for Stateful Applications
- 2023–present Review Editor for Frontiers in High Performance Computing

Award Committee

- 2023 Committee for IEEE CS TCHPC Early Career Researchers Award for Excellence in High Performance Computing

Technical Program Committee

- 2025 **FAST**, 23rd USENIX Conference on File and Storage Technologies
- 2025 **PPoPP**, ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming
- 2025 **NSDI**, 22nd USENIX Symposium on Networked Systems Design and Implementation
- 2024 **SoCC**, ACM Symposium on Cloud Computing
- 2024 **HiPC**, 31st IEEE International Conference on High Performance Computing (HPC), Data, and Analytics
- 2024 **IEEE Cloud**, IEEE International Conference on Cloud Computing
- 2024 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing
- 2024 **IPDPS**, IEEE International Parallel and Distributed Processing Symposium
- 2023 **SoCC**, ACM Symposium on Cloud Computing
- 2023 **HotStorage**, ACM Workshop on Hot Topics in Storage and File Systems

2023 **IEEE Cloud**, IEEE International Conference on Cloud Computing

2023 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing

2023 **IPDPS**, IEEE International Parallel and Distributed Processing Symposium

2022 **NAS** (storage track), IEEE International Conference on Networking, Architecture, and Storage

2022 **KDD** (ERC), ACM SIGKDD International Conference on Data Mining

2022 **HiPS**, Workshop on High Performance Serverless Computing@HPDC 2022

2022 **SEC**, ACM/IEEE Symposium on Edge Computing

2022 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing

2021 **REX-IO**, Workshop on Re-envisioning Extreme-Scale I/O for Emerging Hybrid HPC Workloads

2021 **ICDCS**, 41st IEEE International Conference on Distributed Computing Systems

2021 **SEC**, ACM/IEEE Symposium on Edge Computing

2021 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing

2020 **PDSW-DISCS**, 5th International Parallel Data Systems Workshop

2020 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing

2020 **ICDCS**, 40th IEEE International Conference on Distributed Computing Systems

2020 **SC**, International Conference for High Performance Computing, Networking, Storage, and Analysis

2020 **MSST**, 36th International Conference on Massive Storage Systems and Technology

2020 **CCGrid**, IEEE/ACM International Symposium in Cluster, Cloud, and Grid Computing

2019 **PDSW-DISCS**, 4th International Parallel Data Systems Workshop

2019 **MASCOTS**, 27th IEEE International Symposium on the Modeling, Analysis, and Simulation of Computer and Telecommunication Systems

2019 **IPDPS** (ERC), IEEE International Parallel and Distributed Processing Symposium

2019 **CCGrid** (ERC), IEEE/ACM International Symposium in Cluster, Cloud, and Grid Computing

2019 **BlockDM**, First IEEE International Workshop on Blockchain and Data Management

2019 **MSST**, 35th International Conference on Massive Storage Systems and Technology

2019 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing

2018 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing

2018 **ICS** (ERC), ACM International Conference on Supercomputing

2018 **IPDPS** (ERC), IEEE International Parallel and Distributed Processing Symposium

2018 **ICCCN**, International Conference on Mobile Systems and Pervasive Computing

2018 **MobiSPC**, International Conference on Computer Communications and Networks

2017 **BDCAT**, IEEE/ACM International Conference on Big Data Computing, Applications and Technologies

Proposal Review Panels

2023 **DOE**, Office of Science, Advanced Scientific Computing Research (ASCR) Program

2021 **NSF**, Computer Systems Research (CSR) under the division of Computer and Network Systems (CNS)

2020 **NSF**, Computer Systems Research (CSR) under the division of Computer and Network Systems (CNS)

2019 **NSF**, Computer Systems Research (CSR) under the division of Computer and Network Systems (CNS)

2019 **NSF**, Software and Hardware Foundations (SHF) under the division of Computing and Communication Foundations (CCF)

Shadow Technical Program Committees

- 2018 **EuroSys**, ACM European Conference on Computer Systems
- 2017 **EuroSys**, ACM European Conference on Computer Systems
- 2016 **EuroSys**, ACM European Conference on Computer Systems

Journal Reviews

- 2019 **TC**, IEEE Transactions on Computers
- 2019 **JPDC**, Journal of Parallel and Distributed Computing
- 2019 **TPDS**, IEEE Transactions on Parallel and Distributed Systems
- 2019 **TCC**, IEEE Transactions on Cloud Computing
- 2018 **TPDS**, IEEE Transactions on Parallel and Distributed Systems
- 2018 **TOS**, ACM Transactions on Storage
- 2018 **TCC**, IEEE Transactions on Cloud Computing
- 2017 **TOS**, ACM Transactions on Storage
- 2017 **TC**, IEEE Transactions on Computers
- 2017 **TAAS**, ACM Transactions on Autonomous and Adaptive Systems
- 2017 **JPDC**, Journal of Parallel and Distributed Computing
- 2016 **TPDS**, IEEE Transactions on Parallel and Distributed Systems
- 2015 **TPDS**, IEEE Transactions on Parallel and Distributed Systems

Conference Reviews

- 2017 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing
- 2017 **Cluster**, IEEE Cluster Conference
- 2017 **NAS**, International Conference on Networking, Architecture, and Storage
- 2017 **ICS**, ACM International Conference on Supercomputing
- 2017 **ICDCS**, IEEE International Conference on Distributed Computing Systems
- 2016 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing
- 2016 **ICDCS**, IEEE International Conference on Distributed Computing Systems
- 2016 **SC**, International Conference for High Performance Computing, Networking, Storage, and Analysis
- 2016 **BigData**, IEEE International Conference on Big Data
- 2016 **ICPP**, International Conference on Parallel Processing
- 2015 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing
- 2015 **SC**, International Conference for High Performance Computing, Networking, Storage, and Analysis
- 2014 **HPDC**, ACM International Symposium on High-Performance Parallel and Distributed Computing
- 2014 **BigData**, IEEE International Conference on Big Data