Yue Cheng

Associate Professor of Data Science and Computer Science
University of Virginia

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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 $\times 2$, VLDB'23

[VLDB '24]★ **Everything You Always Wanted to Know About Storage Compressibility of Pre-Trained ML Models but Were Afraid to Ask**.
50^{th} International Conference on Very Large Data Bases (***VLDB'24***), (*To appear*).
Zhaoyuan Su[A], Ammar Ahmed, Zirui Wang[A], Ali Anwar, **Yue Cheng**.

[VLDB '24]★ **Algorithmic Complexity Attacks for Dynamic Learned Indexes**.
50^{th} International Conference on Very Large Data Bases (***VLDB'24***), (*To appear*).
Rui Yang[A], 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 Fu[A], Ruizhe Shi[M], 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 Shi[M], 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 Carver[A], Runzhou Han, Jingyuan Zhang[A], Mai Zheng, **Yue Cheng**.

[VLDB '23]★ **InfiniStore: Elastic Serverless Cloud Storage**.
49^{th} 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 Rupprecht, 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 Custum 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**.
20^{th} 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 Rupprecht, Dimitrios Skourtis, Feng Yan, **Yue Cheng**.

[PDSW '19] **In Search of a Fast and Efficient Serverless DAG Engine**.
The 4^{th} 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 15^{th} 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 Douglis, and Ali R. Butt.

[APSys '18] **Characterizing Co-located Datacenter Workloads: An Alibaba Case Study**.
The 9^{th} 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 Douglis, 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 8^{th} 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 25^{th} 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 1^{st} 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 10^{th} 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 7^{th} 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 24^{th} 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 10^{th} 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 6^{th} 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 Douglis, 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 **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: ??

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/bespokv

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

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 **NSDI**, 22^{nd} USENIX Symposium on Networked Systems Design and Implementation

2024 **SoCC**, ACM Symposium on Cloud Computing

2024 **HiPC**, 31^{st} 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**, 41^{st} 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**, 5^{th} International Parallel Data Systems Workshop

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

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

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

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

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

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

2019 **MASCOTS**, 27^{th} 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**, 35^{th} 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 Foudations (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