Ali Anwar

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Dearborn, MI 48126
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Research Interests

Cloud Storage Systems, Machine Learning Systems, and Serverless Computing Platforms. The overarching goal of my research is to enable efficient and flexible systems for the growing data demands of modern applications, like distributed machine learning, running on existing as well as emerging computing platforms. My current research lies in the intersection of machine learning and distributed systems. Specifically, I am doing research on improving machine learning (e.g., speed, scalability, reliability) through innovations in algorithms and systems.

Education

2013—2018 **Virginia Tech**.
Ph.D. in Computer Science
Dissertation: Towards Efficient and Flexible Object Storage Using Resource and Functional Partitioning

2009–2013 **University of Engineering & Technology Lahore**.
M.Sc. in Computer Engineering

2005–2009 **University of Engineering & Technology Lahore**.
B.Sc. in Electrical Engineering

Employment

06/2018–Present **Research Staff Member**, *IBM Research—Almaden*.
AI Platforms

2014, 2015, 2017 **Summer Research Intern**, *IBM Research*.
AI Platforms, Cloud Storage, Cloud Monitoring

06/2009–08/2013 **Technical lead**, *Mentor Graphics*.
Embedded Linux/Tools

Honors & Awards

2020 IBM Second Invention Plateau Award

2019 IBM Outstanding Research Accomplishment award for Advancing Adversarial Robustness in AI Models. Out of 355 nominations reflecting the work of almost 2,000 contributors from IBM Research.

2019 Best Paper Award AISec'19

2019 IBM First Invention Plateau Award

2019 IBM Senior Manager's Choice Award

2019 IBM Manager's Choice Award

2018 USENIX FAST'Travel Grant recipient.

2015 Virginia Tech: Pratt Fellowship awarded by Dept. of Computer Science.

2015 USENIX FAST', ACM APSys' Travel Grant recipient.

2014 IEEE Cluster', USENIX OSDI' Travel Grant recipient.

Selected Press

- **[IEEE SPECTRUM]** Cloud Services Tool Lets You Pay for Data You Use—Not Data You Store

- **[Paper review]** InfiniCache: Distributed Cache on Top of AWS Lambda
- **[Alibaba Cloud]** Alibaba Cluster Data: Using 270 GB of Open Source Data to Understand Alibaba Data Centers
- **[Hackernoon]** Open Season for Research: Alibaba Releases Cluster Data from 4000 Servers
- **[TechXplore, IoTLime, VT News, NSF News]** Researchers create first-of-its-kind composable storage platform for high-performance computing
- **[R&D Magzine, ScienceDaily]** New Framework Pushes the Limits of High-Performance Computing
- **[NSF News, VT News, R&D Magzine, ScienceDaily]** Smartly Containing the Cloud Increases Computing Efficiency, Says First-of-its-kind Study

Publications

(Authors marked with $\star$ are the summer interns/students that I mentored/collaborated with after joining IBM Research)

[FAST'21] Alex Merenstein*, Vasily Tarasov, **Ali Anwar**, Deepavali Bhagwat, Lukas Rupprecht, Dimitris Skourtis, Erez Zadok. *CNSBench: A Cloud Native Storage Benchmark.*. In 19th USENIX Conference on File and Storage Technologies **(USENIX FAST'21)** (AR: $28/139 = 21.5\%$).

[AAAI'21] Syed Zawad*, Ahsan Ali*, Pin-Yu Chen, **Ali Anwar**, Yi Zhou, Nathalie Barcaldoand, Yuan Tian, Feng Yan *Curse or Redemption? How Data HeterogeneityAffects the Robustness of Federated Learning*. In Thirty-Fifth AAAI Conference on Artificial Intelligence **(AAAI'21)** (AR: $1,692/9,034 = 18.7\%$).

[TPDS'20] Nannan Zhao*, Vasily Tarasov, Hadeel Albahar*, **Ali Anwar**, Lukas Rupprecht, Dimitrios Skourtis, Arnab K. Paul, Keren Chen, Mohamed Mohamed, and Ali R. Butt *Large-Scale Analysis of the Docker Images and Performance Implications to Container Storage Systems*. In IEEE Transactions on Parallel and Distributed Systems **(IEEE TPDS'20)**.

[SoCC'20] Benjamin Carver*, Jingyuan Zhang*, Ao Wang*, **Ali Anwar**, Panruo Wu, Yue Cheng. *Wukong: A Scalable and Locality-Enhanced Framework for Serverless Parallel Computing*. In ACM Symposium on Cloud Computing **(ACM SoCC'20)** (AR: $35/143 = 24.4\%$).

[ATC'20] Nannan Zhao*, Hadeel Albahar*, Subil Abraham, Keren Chen, Vasily Tarasov, Dimitrios Skourtis, Lukas Rupprecht, **Ali Anwar**, and Ali. R. But. *DupHunter: Flexible High-Performance Deduplication for Docker Registries*. In 2020 USENIX Annual Technical Conference **(USENIX ATC'20)** (AR: $65/348 = 18.6\%$).

[TPDS'20] **Ali Anwar**, Yue Cheng, Hai Huang, Jingoo Han, Hyogi Sim, Dongyoon Lee, Fred Douglis, Ali R. Butt. *Customizable Scale-Out Key-Value Stores*. In IEEE Transactions on Parallel and Distributed Systems **(IEEE TPDS'20)**.

[HotStorage'20] Alex Merenstein*, Vasily Tarasov, **Ali Anwar**, Deepavali Bhagwat, Lukas Rupprecht, Dimitris Skourtis, Erez Zadok. *Position: The Case for Benchmarking Control Operations in Cloud Native Storage*. In 12th USENIX Workshop on Hot Topics in Storage and File Systems (**USENIX HotStorage'20**) (AR: $26/64 = 40.6\%$).

[HotStorage'20] Pranav Bhandari*, Avani Wildani, Dimitris Skourtis, Vasily Tarasov, Deepavali Bhagwat, Lukas Rupprecht, **Ali Anwar**. *Position: Can Microservices Drive a Renaissance in Workload-Aware Storage Management?*. In 12th USENIX Workshop on Hot Topics in Storage and File Systems (**USENIX HotStorage'20**) **(Poster)**.

[Arxiv'20] Ludwig, Heiko, Nathalie Baracaldo, Gegi Thomas, Yi Zhou, **Ali Anwar**, Shashank Rajamoni, Yuya Ong, et al. *IBM Federated Learning: an Enterprise Framework White Paper V0.1 arXiv:2007.10987* (**Arxiv'20**) **(White Paper)**.

[HPDC'20] Zheng Chai*, Ali Ahsan*, Syed Zawad*, Stacey Truex*, **Ali Anwar**, Nathalie Baracaldo, Yi Zhao, Heiko Ludwig, Feng Yan, and Yue Cheng, *A Tier-based Federated Learning System*. ACM Symposium on High-Performance Parallel and Distributed Computing **(ACM HPDC'20)** (AR: $16/71 = 22.5\%$)

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[FAST'20] Ao Wang*, Jingyuan Zhang*, Xiaolong Ma*, **Ali Anwar**, Lukas Rupprecht, Dimitrios Skourtis, Vasily Tarasov, Feng Yan, and Yue Cheng, *InfiniCache: Exploiting Ephemeral Serverless Functions to Build a Cost-Effective Memory Cache*. In 18th USENIX Conference on File and Storage Technologies **(USENIX FAST'20)** (AR: $23/138 = 17\%$).

[FS'19] Toyotaro Suzumura, Yi Zhou, Natahalie Baracaldo, Guangnan Ye, Keith Houck, Ryo Kawahara, **Ali Anwar**, Lucia Larise Stavarache, Yuji Watanabe, Pablo Loyola, Daniel Klyashtorny, Heiko Ludwig, Kumar Bhaskaran. *Towards Federated Graph Learning for Collaborative Financial Crimes Detection*. In NeurIPS 2019 Workshop on Robust AI in Financial Services: Data, Fairness, Explainability, Trustworthiness, and Privacy **(Robust AI in FS 2019)**

[;login:] **Ali Anwar**, Lukas Rupprecht, Dimitrios Skourtis, and Vasily Tarasov. *Challenges in Storing Docker Images*. In ;login: The USENIX Magzine **(;login:)**.

[IoT'19] Tim d'Hondt*, Anna Wilbik, Paul Grefen, Heiko Ludwig, Natalie Baracaldo, **Ali Anwar**. *Using BPM Technology to Deploy and Manage Distributed Analytics in Collaborative IoT-Driven Business Scenarios*. In Proceedings of the 9th International Conference on the Internet of Things **(IoT'19)**, Bilbao, Spain.

[AISec'19] Runhua Xu*, Nathalie Baracaldo, Yi Zhou, **Ali Anwar**, Heiko Ludwig. *HybridAlpha: An Efficient Approach for Privacy-Preserving Federated Learning*. In Proceedings of the 12th ACM Workshop on Artificial Intelligence and Security **(ACM AISec'19)**, London, UK (AR: $10/42 = 23.8\%$).

[AISec'19] Stacey Truex*, Nathalie Baracaldo, **Ali Anwar**, Thomas Steinke, Heiko Ludwig, Rui Zhang, Yi Zhou. *A Hybrid Approach to Privacy-Preserving Federated Learning*. In Proceedings of the 12th ACM Workshop on Artificial Intelligence and Security **(ACM AISec'19)**, London, UK (AR: $10/42 = 23.8\%$). **[Best Paper Award]**

[Cluster'19] Nannan Zhao*, Vasily Tarasov, Hadeel Albahar, **Ali Anwar**, Lukas Rupprecht, Dimitrios Skourtis, Amit S. Warke, Mohamed Mohamed, and Ali R. Butt. *Large-Scale Analysis of the Docker Hub Dataset*. In Proceedings of the IEEE International Conference on Cluster Computing **(IEEE Cluster'19)**, Albuquerque, NM (AR: $39/141 = 27.7\%$).

[Cloud'19] Michael Littley, **Ali Anwar**, Hannan Fayyaz, Zeshan Fayyaz, Vasily Tarasov, Lukas Rupprecht, Dimitrios Skourtis, Mohamed Mohamed, Heiko Ludwig, Yue Cheng, Ali R. Butt. *Bolt: Towards a Scalable Docker Registry*. In Proceedings of the IEEE International Conference on Cloud Computing **(IEEE Cloud'19)**, Milan, Italy (AR: 20.8%).

[Cloud'19] Nannan Zhao*, Vasily Tarasov, **Ali Anwar**, Lukas Rupprecht, Dimitrios Skourtis, Amit S Warke, Mohamed Mohamed, Dean Hildebrand and Ali R. Butt. *Slimmer: Weight Loss Secrets for Docker Registries*. In Proceedings of the IEEE International Conference on Cloud Computing **(IEEE Cloud'19)**, Milan, Italy. **(Extended Abstract)**.

[OPML'19] Zheng Chai*, Hannan Fayyaz*, Zeshan Fayyaz*, **Ali Anwar**, Yi Zhou, Nathalie Baracaldo, Heiko Ludwig, Yue Cheng. *Towards Taming the Resource and Data Heterogeneity in Federated Learning*. In Proceedings of the 2019 USENIX Conference on Operational Machine Learning **(USENIX OPML'19)**, Santa Clara, CA (AR: $17/30 = 56.6\%$).

[TPDS'19] Kirk W. Cameron, **Ali Anwar**, Yue Cheng, Li Xu, Bo Li, Uday Ananth, Jon Bernard, Chandler Jearls, Thomas Lux, Yili Hong, Layne T. Watson, Ali R. Butt. *MOANA: Modeling and Analyzing I/O Variability in Parallel System Experimental Design*. In IEEE Transactions on Parallel and Distributed Systems **(IEEE TPDS'19)**.

[SC'18] **Ali Anwar**, Yue Cheng, Hai Huang, Jingoo Han, Hyogi Sim, Dongyoon Lee, Fred Douglis, Ali R. Butt. *BESPOKV: Application Tailored Scale-Out Key-Value Stores*. In Proceedings of the International Conference for High Performance Computing, Networking, Storage, and Analysis (**SC'18**), Dallas, TX (AR: $68/288 = 23.6\%$).

[BigData'18] Yue Cheng, **Ali Anwar**, Xuejing Duan. *Analyzing Alibaba's Co-located Datacenter Workloads*. In Proceedings of the IEEE International Conference on Big Data (**BigData'18**), Seattle, WA.

[APSys'18] Yue Cheng, Zheng Chai, **Ali Anwar**. *Characterizing Co-located Datacenter Workloads: An Alibaba Case Study* In Proceedings of the 9^th ACM SIGOPS Asia-Pacific Workshop on Systems (**ACM APSys'18**), Jeju Island, South Korea.

[TPDP'18] Stacey Truex*, Nathalie Baracaldo, **Ali Anwar**, Thomas Steinke, Heiko Ludwig and Rui Zhang. *A Hybrid Trust Model for Distributed Differential Privacy*. In Proceedings of the Theory and Practice of Differential Privacy (**TPDP'18**), Toronto, Canada **(Poster)**.

[FAST'18] **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. *Improving Docker Registry Design based on Production Workload Analysis*. In Proceedings of the 16^{th} USENIX Conference on File and Storage Technologies (**USENIX FAST'18**), Oakland, CA (AR: $23/139 = 16.5\%$).

[IPDPS'18] Nannan Zhao, **Ali Anwar**, Yue Cheng, Mohammed Salman, Daping Li, Jiguang Wan, Changsheng Xie, Xubin He, Feiyi Wang, and Ali R. Butt. *Chameleon: An Adaptive Wear Balancer for Flash Clusters*. In Proceedings of the 33^{rd} IEEE International Parallel & Distributed Processing Symposium (**IEEE IPDPS'18**), Rio de Janeiro, Brazil (AR: $113/461 = 24.5\%$).

[Technical Report] Kirk W. Cameron, **Ali Anwar**, Yue Cheng, Li Xu, Bo Li, Uday Ananth, Thomas Lux, Yili Hong, Layne T. Watson, Ali R. But. *MOANA: Modeling and Analyzing HPC I/O Variability*.

[HotStorage'16] **Ali Anwar**, Yue Cheng, Hai Huang, and Ali R. Butt. *ClusterOn: Building Highly Configurable and Reusable Clustered Data Services using Simple Data Nodes*. In Proceedings of the 8^{th} USENIX Workshop on Hot Topics in Storage and File Systems (**USENIX HotStorage'16**), Denver, CO.

[HPDC'16] **Ali Anwar**, Yue Cheng, Aayush Gupta, and Ali R. Butt. *MOS: Workload-aware Elasticity for Cloud Object Stores*. In Proceedings of the 25^{th} ACM Symposium on High-Performance Parallel and Distributed Computing (**ACM HPDC'16**), Kyoto, Japan (AR: $20/129 = 15.5\%$).

[VarSys'16] **Ali Anwar**, Yue Cheng, and Ali R. Butt. *Towards Managing Variability in the Cloud*. In Proceedings of the 1^{st} IEEE International Workshop on Variability in Parallel and Distributed Systems (**IEEE VarSys'16**), Chicago, IL.

[SC'15] Hyogi Sim, Youngjae Kim, Sudharshan S. Vazhkudai, Devesh Tiwari, **Ali Anwar**, Ali R. Butt, and Lavanya Ramakrishnan. *AnalyzeThis: An Analysis Workflow-Aware Storage System*. In Proceedings of the ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (**ACM/IEEE SC'15**), Austin, TX (AR: $79/358 = 22\%$).

[PDSW'15] **Ali Anwar**, Yue Cheng, Aayush Gupta, and Ali R. Butt. *Taming the Cloud Object Stores with MOS*. In Proceedings of the 10^{th} ACM Parallel Data Storage Workshop (**ACM PDSW'15**), Austin, TX (AR: $9/25 = 36\%$).

[APSys'15] **Ali Anwar**, Anca Sailer, Andrzej Kochut, Ali R. Butt. *Anatomy of Cloud Monitoring and Metering: A case study and open problems*. In Proceedings of the 6th ACM SIGOPS Asia-Pacific Workshop on Systems (**ACM APSys'15**), Tokyo, Japan (AR: $20/68 = 29.4\%$).

[APSys'15] **Ali Anwar**, Yue Cheng, Aayush Gupta, and Ali R. Butt. *Taming the Cloud Object Stores with MOS*. In the 6th ACM SIGOPS Asia-Pacific Workshop on Systems (**ACM APSys'15**), Tokyo, Japan **(Poster)**.

[ATC'15] Hyogi Sim, Youngjae Kim, Sudharshan S. Vazhkudai, Devesh Tiwari, **Ali Anwar**, Ali R. Butt, and Lavanya Ramakrishnan. *AnalyzeThis: An Analysis Workflow-Aware Storage System*. In Proceedings of the 2015 USENIX Annual Technical Conference (**USENIX ATC'15**), Santa Clara, California **(Poster)**.

[Cloud'15] **Ali Anwar**, Anca Sailer, Andrzej Kochut, Charles O. Schulz, Alla Segal, and Ali R. Butt. *Cost-Aware Cloud Metering with Scalable Service Management Infrastructure*. In Proceedings of the IEEE 2015 International Conference on Cloud Computing (**IEEE Cloud'15**), NYC, New York (AR: 17%)

[IC2E'15] **Ali Anwar**, Anca Sailer, Andrzej Kochut, Charles O. Schulz, Alla Segal, and Ali R. Butt. *Scalable Metering for an Affordable IT Cloud Service Management*. In Proceedings of the IEEE International Conference on Cloud Engineering (**IEEE IC2E'15**), Tempe, Arizona.

[Cluster'14] **Ali Anwar**, Krish K. R., and Ali R. Butt. *On the Use of Microservers in Supporting Hadoop Applications*. In Proceedings of the IEEE International Conference on Cluster Computing (**IEEE Cluster'14**), Madrid, Spain (AR: $9/122 = 23.8\%$).

[MASCOTS'14] Krish K. R., **Ali Anwar**, and Ali R. Butt. *ΦSched: A Heterogeneity-Aware Hadoop Workflow Scheduler*. In Proceedings of the IEEE 22nd International Symposium on Modeling, Analysis and Simulation of Computer and Telecommunication Systems (**IEEE MASCOTS'14**), Paris, France (AR: $39/192 = 20.3\%$).

[CCGRID'14] Krish K. R., **Ali Anwar**, and Ali R. Butt. *hatS: A Heterogeneity-Aware Tiered Storage for Hadoop*. In Proceedings of the 14th IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (**IEEE/ACM CCGRID'14**), Chicago, Illinois (AR: $54/283 = 19.1\%$).

Patents and Disclosures

[Filed] **Ali Anwar**, Nathalie Baracaldo Angel, Simone Bianco, Vito Paolo Pastore, Yi Zhou. *A system and method for semantic learning on federated learning systems*.

[Filed] Shashank Rajamoni, **Ali Anwar**, Yi Zhou, Heiko Ludwig, Nathalie Baracaldo. *A Cost effective method for parameter sharing in Federated learning*.

[Filed] Yi Zhou, **Ali Anwar**, Nathalie Baracaldo, Heiko Ludwig. *A method to adaptively average model updates in federated learning*.

[Filed] Nathalie Baracaldo, Runhua Xu, Yi Zhou, **Ali Anwar**, Heiko Ludwig. *Efficient private vertical federated learning*.

[Filed] Nathalie Baracaldo, Runhua Xu, Yi Zhou, **Ali Anwar**, Heiko Ludwig. *A method and system to improve efficiency in privacy-preserving federated learning*.

[Filed] Nathalie Baracaldo, Yi Zhou, Bryant Chen, **Ali Anwar**, Heiko Ludwig. *Method to detect backdoor attacks at inference time*.

[Filed] **Ali Anwar**, Yi Zhou, Nathalie Baracaldo, Heiko Ludwig. *A method and system to improve communication overhead in federated learning*.

[Filed] Stacey Truex, Nathalie Baracaldo, **Ali Anwar**, Heiko Ludwig, Thomas Steinke, Rui Zhang. *A method and system to perform private and federated learning* .

[Filed] **Ali Anwar**, Mohamed Mohamed, Samir Tata, Heiko Ludwig. *Dynamic adjustment of parallelism for pulling images from container registries*.

[U.S. Serial No. 14/926,384] **Ali Anwar**, Andrzej Kochut, Anca Sailer, Charles O. Schulz, Alla Segal. *Dynamic Metering Adjustment For Service Management Of Computing Platform*.

[U.S. Serial No. 14/871,443] **Ali Anwar**, Salman A Baset, Andrzej P Kochut, Hui Lei, Anca Sailer, Alla Segal. *Scalable Metering For Cloud Service Management Based On Cost-Awareness*.

Talks

2020 **Federated Learning Systems**
AI Tea Series, George Mason University.

2019 **Introduction to Storage for Containers**
USENIX FAST, NSDI, and Vault. Boston, MA.

2018 **BESPOKV: Application Tailored Scale-Out Key-Value Stores**
International Conference for High Performance Computing, Networking, Storage, and Analysis. Dallas, TX.

2018 **Improving Docker Registry Design based on Production Workload Analysis**
USENIX Conference on File and Storage Technologies. Oakland, CA.

2017 **VOLTRON: Unlocking Pluggable Distributed Key-Value Stores**
IBM Almaden Research Center, San Jose, CA.

2016 **ClusterOn: Building Highly Configurable and Reusable Clustered Data Services using Simple Data Nodes**
USENIX Workshop on Hot Topics in Storage and File Systems. Denver, CO.

2015 **Taming the Cloud Object Stores with MOS**
ACM Parallel Data Storage Workshop. Austin, TX.

2015 **ClusterOn: Building highly configurable and reusable clustered data services using simple data nodes**
IBM T. J. Watson Research Center, Yorktown, NY.

2015 **Anatomy of Cloud Monitoring and Metering: A case study and open problems**
ACM SIGOPS Asia-Pacific Workshop on Systems. Tokyo, Japan.

2015 **Cost-aware cloud metering with scalable service management infrastructure**
IEEE International Conference on Cloud Computing. NYC, New York.

2014 **Scalable Metering for an Affordable IT Cloud Service Management**
IBM T. J. Watson Research Center, Yorktown, NY.

2014 **On the use of microservers in supporting hadoop applications**
IEEE International Conference on Cluster Computing. Madrid, Spain.

Book Chapters

[2018] Ali R. Butt, **Ali Anwar**, Yue Cheng. *SDN helps Big Data to optimize storage*. Big Data and Software Defined Networks

Technology Development

06/2010–08/2013 **Open Source Contributions**
Contributions to the GNU Project debugger (GDB) and BusyBox. (**Sourcery CodeBench**)

06/2009–08/2013 **Embedded Software Tools**
Debugger development to provide development support for embedded systems, from host simulation, through board bring-up and the creation of boot code and drivers, to operating system porting. Managed gdb merges in debugger which include fixing gdb issues and providing patches upstream. Added RAM profile, interrupt handling, and semihosting support for code vector processor (powerpc-eabi). (**Sourcery CodeBench, Mentor Graphics EDGE debugger**)

06/2010–08/2012 **Build system for Mentor Embedded Linux**
Worked in a scrum based agile team, managed create config scripts which are used to define the kernel configuration along with the collection and knobs to be enabled for root file system. (**Mentor Embedded Linux**)

Professional Service

Associate Editor

2020 Neural Processing Letters

Technical Program Committees

2021 The 30th International Symposium on High-Performance Parallel and Distributed Computing (HPDC 2021)

2021 The 21st IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGrid 2021)

2020 The International Conference for High Performance Computing, Networking, Storage, and Analysis (SC 2020)

2020 The 29th International Symposium on High-Performance Parallel and Distributed Computing (HPDC 2020)

2020 The 40th IEEE International Conference on Distributed Computing Systems (ICDCS 2020)

2020 The Eleventh International Conference on Cloud Computing, GRIDs, and Virtualization (CLOUD COMPUTING 2020)

2020 The 20th IEEE/ACM International Symposium on Cluster, Cloud and Internet Computing (CCGrid 2020)

2019 IEEE/ACM Conference on Big Data Computing Applications and Technologies (BDCAT 2019)

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

2019 International Conference on Cluster Computing (IEEE Cluster 2019)

2019 28th International ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC 2019)

2019 35th International Conference on Massive Storage Systems and Technology (MSST 2019)

Miscellaneous

2020 Reviewer for National Fund for Scientific and Technological Research (FONDECYT) of the National Research and Development Agency (ANID)

2020 Reviewer for French National Research Agency (ANR)

2020 External reviewer for USENIX Annual Technical Conference (USENIX ATC'2020)

2020 Sponsorship co-chair for The 29th International Symposium on High-Performance Parallel and Distributed Computing (HPDC'2020)

2019 Organizer for IBM Student Workshop on Systems and Cloud

2019 Reviewer for Natural Sciences and Engineering Research Council of Canada (NSERC)

Journal Reviews

- ACM Transactions on Storage (ACM TOS)
- IEEE Transactions on Knowledge and Data Engineering (IEEE TKDE)
- Transactions on Parallel and Distributed Systems (IEEE TPDS)
- Journal of Parallel and Distributed Computing (JPDC - Elsevier)
- Transactions on Cloud Computing (IEEE TCC)
- Data & Knowledge Engineering (DATAK - Elsevier)
- The Journal of Networks, Software Tools and Applications (Cluster Computing - Springer)
- Sustainable Computing: Informatics and Systems (SUSCOM)
- The International Journal of Computer and Telecommunications Networking (Computer Networks)

Teaching Experience

Spring 2017 **Guest lecturer**, *CS3214 Computer Systems*, CS@VT.

Fall 2017 **Term project mentor**, *CS5204 Operating Systems*, CS@VT.
Guided 4 students on OS course projects

Fall 2016 **Term project mentor**, *CS5204 Operating Systems*, CS@VT.
Guided 6 students on OS course projects

Spring 2016 **Guest lecturer**, *CS6204 Cloud Computing*, CS@VT.

Fall'13—Spring'16 **Teaching assistant**, *CS3214 Computer Systems*, CS@VT.
Lectures; lab/office hours; scripting; grading

Mentoring

PhD Students

2020 Ao Wang, George Mason University

2020 Jingyuan Zhang, George Mason University

2020 Kamala Varma, University of Maryland, College Park

2017 - 2020 Bharti Wadhwa, Virginia Tech

2017 - 2020 Nannan Zhao, Virginia Tech

2019 - 2020 Syed Zawad, University of Nevada, Reno

2019 - 2020 Runhua Xu, University of Pittsburgh
2019 - 2020 Zheng Chai, George Mason University
2019 - 2020 Ali Ahsan, University of Nevada, Reno
2018 - 2019 Stacey Truex, Georgia Tech
2019 Hadeel Albahar, Virginia Tech

Master Students

2020 Benjamin Carver, George Mason University
2019 Kamala Varma, Vanderbilt University
2018 Tim d'Hondt, Eindhoven University of Technnology
2017 - 2018 Michael Littley, Virginia Tech
2016 - 2017 Mohammed Salman, Virginia Tech