Wei Bai

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Research Interests

I am broadly interested in computer networking, with special focuses on data center networking, congestion control, and high performance networked systems.

Education

2013.9-2017.6	**The Hong Kong University of Science and Technology (HKUST)**, Hong Kong SAR, China
	Ph.D. Computer Science and Engineering
	Advisor: Prof. Kai Chen
	Thesis: "Congestion Control Mechanisms for Data Center Networks"
2009.9-2013.7	**Shanghai Jiao Tong University (SJTU)**, Shanghai, China
	B.E. Information Security

Work Experience

Microsoft Research Redmond, Redmond, USA

2021.7-Present	Senior Researcher, Networking Research Group
2020.9-2021.6	Senior Research Software Development Engineer, Networking Research Group
2019.8-2020.8	Research Software Development Engineer 2, Mobility and Networking Research Group

Microsoft Research Asia, Beijing, China

2017.7-2019.8	Researcher (formerly Associate Researcher 2), Networking Research Group

Key Projects at Microsoft

2019.2-Present	**RDMA network**: I am working with Azure networking to develop and operate high performance and reliable network infrastructure to enable the *largest* remote direct memory access (RDMA) deployments in the world. My responsibilities include designing congestion control mechanisms, switch buffer optimization, and switch/NIC qualification.
2018.9-Present	**SONiC**: I am contributing to Software for Open Networking in the Cloud (SONiC), an open source cross-platform switch operating system based on Linux. My contributions include dis-aggregated chassis, QoS/RDMA features, and test system based on programmable hardware.

Awards and Honors

2016, 2017	HKUST Research Travel Grant
2015, 2016	USENIX NSDI Student Grant
2015	**Microsoft Research Asia Fellowship**
2013-2017	HKUST Postgraduate Scholarship
2013	SJTU Outstanding Bachelor Thesis Award (Top 1%)
2012	First Prize, Software Group, Information Security Contest, National Undergraduate Electronic Design Contest

Publications

Conference Publications

[C23] Bojie Li, Gefei Zuo, **Wei Bai**, Lintao Zhang, "1Pipe: Scalable Total Order Communication in Data Center Networks", *to appear* in *Proceedings of the ACM SIGCOMM 2021 Conference* (**SIGCOMM**), Virtual Conference, August 23-27, 2021.

[C22] Hwijoon Lim, **Wei Bai**, Yibo Zhu, Youngmok Jung, Dongsu Han, "Towards Timeout-less Transport in Commodity Datacenter Networks", in *Proceedings of the 16th European Conference on Computer Systems* (**EuroSys**), Virtual Conference, April 26-28, 2021.

[C21] Shuihai Hu, **Wei Bai**, Gaoxiong Zeng, Zilong Wang, Baochen Qiao, Kai Chen, Kun Tan, Yi Wang, "Aeolus: A Building Block for Proactive Transport in Datacenters", in *Proceedings of the ACM SIGCOMM 2020 Conference* (**SIGCOMM**), Virtual Conference, August 10-14, 2020.

[C20] Qun Huang, Haifeng Sun, Patrick P. C. Lee, **Wei Bai**, Feng Zhu, Yungang Bao, "OmniMon: Re-architecting Network Telemetry with Resource Efficiency and Full Accuracy", in *Proceedings of the ACM SIGCOMM 2020 Conference* (**SIGCOMM**), Virtual Conference, August 10-14, 2020.

[C19] **Wei Bai**, Shuihai Hu, Kai Chen, Kun Tan, Yongqiang Xiong, "One More Config is Enough: Saving (DC)TCP for High-speed Extremely Shallow-buffered Datacenters", in *Proceedings of the 39th IEEE International Conference on Computer Communications* (**INFOCOM**), Virtual Conference, July 6-9, 2020.

[C18] Junxue Zhang, **Wei Bai**, Kai Chen, "Enabling ECN for Datacenter Networks with RTT Variations", in *Proceedings of the 15th International Conference on emerging Networking EXperiments and Technologies* (**CoNEXT**), Orlando, Florida, December 9-12, 2019.

[C17] Gaoxiong Zeng, **Wei Bai**, Ge Chen, Kai Chen, Dongsu Han, Yibo Zhu, Lei Cui, "Congestion Control for Cross-Datacenter Networks", in *Proceedings of the 27th IEEE International Conference on Network Protocols* (**ICNP**), Chicago, Illinois, October 7-10, 2019.

[C16] Xiaodong Yi, Junjie Wang, Jingpu Duan, **Wei Bai**, Chuan Wu, Yongqiang Xiong, Dongsu Han, "FlowShader: a Generalized Framework for GPU-accelerated VNF Flow Processing", in *Proceedings of the 27th IEEE International Conference on Network Protocols* (**ICNP**), Chicago, Illinois, October 7-10, 2019.

[C15] Bojie Li, Tianyi Cui, Zibo Wang, **Wei Bai**, Lintao Zhang, "SocksDirect: Datacenter Sockets can be Fast and Compatible" in *Proceedings of the ACM SIGCOMM 2019 Conference* (**SIGCOMM**), Beijing, China, August 19-24, 2019.

[C14] Yang Cheng, Dan Li, Zhiyuan Guo, Binyao Jiang, Jiaxin Lin, Xi Fan, Jinkun Geng, Xinyi Yu, **Wei Bai**, Lei Qu, Ran Shu, Peng Cheng, Yongqiang Xiong, Jianping Wu, "DLBooster: Boosting End-to-End Deep Learning Workflows with Offloading Data Preprocessing Pipelines" in *Proceedings of the 48th International Conference on Parallel Processing* (**ICPP**), Kyoto, Japan, August 5-8, 2019.

[C13] Zhao Lucis Li, Mike Chieh-Jan Liang, **Wei Bai**, Qiming Zheng, Yongqiang Xiong, Guangzhong Sun, "Accelerating Rule-matching Systems with Learned Rankers" in *Proceedings of the 2019 USENIX Annual Technical Conference* (**ATC**), Renton, Washington, July 10-12, 2019 (Short Paper).

[C12] Hong Zhang, Junxue Zhang, **Wei Bai**, Kai Chen, Mosharaf Chowdhury, "Resilient Datacenter Load Balancing in the Wild" in *Proceedings of the ACM SIGCOMM 2017 Conference* (**SIGCOMM**), Los Angeles, California, August 21-25, 2017.

[C11] Ziyang Li, **Wei Bai**, Kai Chen, Dongsu Han, Yiming Zhang, Dongsheng Li, Hongfang Yu, "Rate-Aware Flow Scheduling for Commodity Data Center Networks" in *Proceedings of the 36th Annual IEEE International Conference on Computer Communications* (**INFOCOM**), Atlanta, Georgia, May 1-4, 2017.

[C10] **Wei Bai**, Kai Chen, Li Chen, Changhoon Kim, Haitao Wu, "Enabling ECN over Generic Packet Scheduling" in *Proceedings of the 12th International Conference on emerging Networking EXperiments and Technologies* (**CoNEXT**), Irvine, California, December 12-15, 2016.

[C9] Li Chen, Kai Chen, **Wei Bai**, Mohammad Alizadeh "Scheduling Mix-flows in Commodity Datacenters with Karuna" in *Proceedings of the ACM SIGCOMM 2016 Conference* (**SIGCOMM**), Florianpolis, Brazil, August 22-26, 2016.

[C8] Shuihai Hu, **Wei Bai**, Kai Chen, Chen Tian, Ying Zhang, Haitao Wu, "Providing Bandwidth Guarantees, Work Conservation and Low Latency Simultaneously in the Cloud", in *Proceedings of the 35th Annual IEEE International Conference on Computer Communications* (**INFOCOM**), San Francisco, California, April 10-14, 2016.

[C7] **Wei Bai**, Li Chen, Kai Chen, Haitao Wu "Enabling ECN in Multi-Service Multi-Queue Data Centers" in *Proceedings of the 13th USENIX Symposium on Networked Systems Design and Implementation* (**NSDI**), Santa Clara, California, March 16-18, 2016.

[C6] **Wei Bai**, Li Chen, Kai Chen, Dongsu Han, Chen Tian, Hao Wang, "Information-Agnostic Flow Scheduling for Commodity Data Centers" in *Proceedings of the 12th USENIX Symposium on Networked Systems Design and Implementation* (**NSDI**), Oakland, California, May 4-6, 2015.

[C5] Shuihai Hu, Kai Chen, Haitao Wu, **Wei Bai**, Chang Lan, Hao Wang, Hongze Zhao, Chuanxiong Guo, "Explicit Path Control in Commodity Data Centers: Design and Applications" in *Proceedings of the 12th USENIX Symposium on Networked Systems Design and Implementation* (**NSDI**), Oakland, California, May 4-6, 2015.

[C4] Yangming Zhao, Kai Chen, **Wei Bai**, Minlan Yu, Chen Tian, Yanhui Geng, Yiming Zhang, Dan Li, Sheng Wang, "RAPIER: Integrating Routing and Scheduling for Coflow-aware Data Center Networks" in *Proceedings of the 34th Annual IEEE International Conference on Computer Communications* (**INFOCOM**), Hong Kong, April 26-May 1, 2015.

[C3] Hong Zhang, Kai Chen, **Wei Bai**, Dongsu Han, Chen Tian, Hao Wang, Haibing Guan, Ming Zhang, "Guaranteeing Deadlines for Inter-Datacenter Transfers" in *Proceedings of the 10th European Conference on Computer Systems* (**EuroSys**), Bordeaux, France, April 21-24, 2015.

[C2] **Wei Bai**, Kai Chen, Haitao Wu, Wuwei Lan, Yangming Zhao, "PAC: Taming TCP Incast Congestion Using Proactive ACK Control" in *Proceedings of the IEEE 22nd International Conference on Network Protocols* (**ICNP**), Research Triangle, North Carolina, October 21-24, 2014.

[C1] Yang Peng, Kai Chen, Guohui Wang, **Wei Bai**, Zhiqiang Ma, Lin Gu, "Hadoop-Watch: A First Step Towards Comprehensive Traffic Forecasting in Cloud Computing" in *Proceedings of the 33rd Annual IEEE International Conference on Computer Communications* (**INFOCOM**), Toronto, Canada, April 27-May 2, 2014.

Workshop Publications

[W5] Jiacheng Xia, Gaoxiong Zeng, Junxue Zhang, Weiyan Wang, **Wei Bai**, Junchen Jiang, Kai Chen, "Rethinking transport layer design for distributed machine learning" in *Proceedings of the 3rd Asia-Pacific Workshop on Networking* (**APNet**), Beijing, China, August 17-18, 2019.

[W4] Shuihai Hu, **Wei Bai**, Baochen Qiao, Kai Chen, Kun Tan, "Augmenting Proactive Congestion Control with Aeolus" in *Proceedings of the 2nd Asia-Pacific Workshop on Networking* (**APNet**), Beijing, China, August 2-3, 2018.

[W3] Gaoxiong Zeng, **Wei Bai**, Ge Chen, Kai Chen, Dongsu Han, Yibo Zhu, "Combining ECN and RTT for Datacenter Transport" in *Proceedings of the 1st Asia-Pacific Workshop on Networking* (**APNet**), Hong Kong, China, August 3-4, 2017.

[W2] **Wei Bai**, Kai Chen, Shuihai Hu, Kun Tan, Yongqiang Xiong, "Congestion Control for High-speed Extremely Shallow-buffered Datacenter Networks" in *Proceedings of the 1st Asia-Pacific Workshop on Networking* (**APNet**), Hong Kong, China, August 3-4, 2017.

[W1] **Wei Bai**, Li Chen, Kai Chen, Dongsu Han, Chen Tian, Weicheng Sun, "PIAS: Practical Information-Agnostic Flow Scheduling for Data Center Networks" in *Proceedings of the 13th ACM Workshop on Hot Topics in Networks* (**HotNets**), Los Angeles, California, October 27-28, 2014.

Journal Publications

[J10] Gaoxiong Zeng, **Wei Bai**, Ge Chen, Kai Chen, Dongsu Han, Yibo Zhu, Lei Cui, "Congestion Control for Cross-Datacenter Networks", in *IEEE/ACM Transactions on Networking* (**ToN**), 2022.

[J9] Shuihai Hu, Gaoxiong Zeng, **Wei Bai**, Zilong Wang, Baochen Qiao, Kai Chen, Kun Tan, Yi Wang, "Aeolus: A Building Block for Proactive Transport in Datacenter Networks", in *IEEE/ACM Transactions on Networking* (**ToN**), 2021.

[J8] Yang Cheng, Dan Li, Zhiyuan Guo, Binyao Jiang, Jinkun Geng, **Wei Bai**, Jianping Wu, Yongqiang Xiong "Accelerating End-to-End Deep Learning Workflow With Codesign of Data Preprocessing and Scheduling", in *IEEE Transactions on Parallel and Distributed Systems* (**TPDS**), 2020.

[J7] **Wei Bai**, Shuihai Hu, Kai Chen, Kun Tan, Yongqiang Xiong, "One More Config is Enough: Saving (DC)TCP for High-speed Extremely Shallow-buffered Datacenters", in *IEEE/ACM Transactions on Networking* (**ToN**), 2020.

[J6] Shuihai Hu, **Wei Bai**, Kai Chen, Chen Tian, Ying Zhang, Haitao Wu, "Providing Bandwidth Guarantees, Work Conservation and Low Latency Simultaneously in the Cloud", in *IEEE Transactions on Cloud Computing* (**TCC**), 2018.

[J5] Shuhao Liu, Hong Xu, Libin Liu, **Wei Bai**, Kai Chen, Zhiping Cai, "RepNet: Cutting Latency with Flow Replication in Data Center Networks", in *IEEE Transactions on Services Computing* (**TSC**), 2018.

[J4] **Wei Bai**, Li Chen, Kai Chen, Dongsu Han, Chen Tian, Hao Wang, "PIAS: Practical Information-Agnostic Flow Scheduling for Commodity Data Centers" in *IEEE/ACM Transactions on Networking*, (**ToN**), 2017.

[J3] Hong Zhang, Kai Chen, **Wei Bai**, Dongsu Han, Chen Tian, Hao Wang, Haibing Guan, Ming Zhang, "Guaranteeing Deadlines for Inter-Datacenter Transfers" in *IEEE/ACM Transactions on Networking* (**ToN**), 2017.

[J2] Shuihai Hu, Kai Chen, Haitao Wu, **Wei Bai**, Chang Lan, Hao Wang, Hongze Zhao, Chuanxiong Guo, "Explicit Path Control in Commodity Data Centers: Design and Applications" in *IEEE/ACM Transactions on Networking*, (**ToN**), 2016.

[J1] Yang Peng, Kai Chen, Guohui Wang, **Wei Bai**, Yangming Zhao, Hao Wang, Yanhui Geng, Zhiqiang Ma, Lin Gu, "Towards Comprehensive Traffic Forecasting in Cloud Computing: Design and Application" in *IEEE/ACM Transactions on Networking* (**ToN**), 2016.

Selected Talks

May 2022	RDMA at Cloud Region Scale: A Researcher's Experience & View, Systems Seminar, Rice University
Dec. 2020	Aeolus: A Building Block for Proactive Transport in Datacenters, Systems and Networking Seminar, Duke University
Jan. 2019	Build Reliable Cloud Networks with SONiC and ONE, OCP China Technology Day, Shenzhen, China

Oct. 2018	Congestion Control Mechanisms for Data Center Networks, HotDC 2018, Beijing, China
Aug. 2017	Experiments with Data Center Congestion Control Research, APNet 2017, Hong Kong, China
Dec. 2016	Enabling ECN over Generic Packet Scheduling, CoNEXT 2016, Irvine, California
Mar. 2016	Enabling ECN in Multi-Service Multi-Queue Data Centers, NSDI 2016, Santa Clara, California
May 2015	Information-Agnostic Flow Scheduling for Commodity Data Centers, NSDI 2015, Oakland, California

Professional Activities

Journal Editorship

Editorial Board (Networking Area) Member, Journal of Systems Research (**JSys**), 2021-2022

Technical Program Committee

ACM SIGMETRICS 2023

ACM SIGCOMM Symposium on SDN Research 2022 (**SOSR 2022**)

ACM SIGMETRICS / IFIP Performance 2022 (**SIGMETRICS / Performance 2022**)

ACM SIGCOMM Symposium on SDN Research 2021 (**SOSR 2021**)

The 5th Asia-Pacific Workshop on Networking (**APNet 2021**)

The 4th Asia-Pacific Workshop on Networking (**APNet 2020**)

The 11th ACM SIGOPS Asia-Pacific Workshop on Systems (**APSys 2020**)

The 3rd Asia-Pacific Workshop on Networking (**APNet 2019**)

The 38th IEEE International Conference on Distributed Computing Systems (**ICDCS 2018**), "Cloud Computing and Data Centers" Track

Organizing Committee

Web Chair, ACM SIGCOMM Symposium on SDN Research 2021 (**SOSR 2021**)

Publicity Chair, The 4th Asia-Pacific Workshop on Networking (**APNet 2020**)

Registration Chair, ACM SIGCOMM 2019 Conference (**SIGCOMM 2019**)

Web Chair, The 3rd Asia-Pacific Workshop on Networking (**APNet 2019**)

Web Chair, The 2nd Asia-Pacific Workshop on Networking (**APNet 2018**)

Reviewer

IEEE/ACM Transactions on Networking

Elsevier Computer Networks

IEEE Transactions on Network and Service Management

IEEE Communications Letters

ACM Transactions on Storage

IEEE Transactions on Cloud Computing

ACM Transactions on Architecture and Code Optimization

Elsevier Future Generation Computer Systems

References

Available upon request