

Mohammad Alizadeh

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Research Interests

Computer networks and systems, network algorithms, cloud computing

Education

- 2013 **Ph.D. Electrical Engineering**, Stanford University
Thesis title: “Packet Transport Mechanisms for Data Center Networks”
Thesis advisor: Balaji Prabhakar
- 2009 **M.Sc. Electrical Engineering**, Stanford University
- 2006 **B.Sc. Electrical Engineering**, Sharif University of Technology, Iran

Employment

- 2015– *TIBCO Career Development Assistant Professor of Computer Science*
Massachusetts Institute of Technology
- 2014-2015 *Principal Engineer*
Cisco Systems
- 2013-2014 *Senior Technical Leader*
Cisco Systems
- 2012-2013 *Research Engineer*
Insieme Networks
- 2009-2010 *Research Intern*
Microsoft Research

Awards and Honors

1. *NSF CAREER Award*, 2018.
2. *SIGCOMM Rising Star Award*, 2017.
3. *Alfred P. Sloan Research Fellowship*, 2017.
4. *ACM SIGCOMM Best Paper Award*, 2014 and 2017.
5. *Google Faculty Research Award*, 2016 and 2018.
6. *Facebook Faculty Award*, 2016 and 2018.

7. *Caroline and Fabian Pease Stanford Graduate Fellowship*, 2008-2011.
8. *Numerical Technologies Inc. Prize and Fellowship*, 2007.
9. Ranked 1st in the Stanford Electrical Engineering Ph.D. Qualifying Examination, 2007.

Professional Service

1. Program Committee Member, ACM HotNets, 2018.
2. Program Committee Member, ACM SIGCOMM, 2018.
3. Program Committee Member, Usenix NSDI, 2018.
4. Program Committee Member, ACM HotNets 2017.
5. Co-chair, ACM SIGCOMM Workshop on Kernel-Bypass Networks (KBNets'17), 2017.
6. Program Committee Member, ACM SIGCOMM, 2017.
7. Program Committee Member, ACM CoNEXT, 2016.
8. Co-organizer, 3rd New England Networking and Systems Day, 2016.
9. Co-organizer, Dagstuhl Seminar on “Network Latency Control in Data Centers” at Schloss Dagstuhl, Germany, 2016.
10. Co-organizer, 2nd New England Networking and Systems Day, 2015.
11. Program Committee Member, ACM SIGCOMM, 2016.
12. Program Committee Member, Usenix NSDI, 2016.
13. Program Committee Member, ACM SIGCOMM, 2015.
14. Program Committee Member, ACM SIGCOMM Symposium on SDN Research (SOSR), 2015.
15. Program Committee Member, ACM SIGMETRICS, 2015.
16. Program Committee Member, ACM/IEEE Architectures for Networking and Communications Systems (ANCS), 2014.

Publications

Journal Publications

1. Shaileshh Bojja Venkatakrisnan, Mohammad Alizadeh, and Pramod Viswanath. Costly circuits, submodular schedules and approximate carathéodory theorems. *Queueing Syst. Theory Appl.*, 88(3-4):311–347, April 2018.

Conference Publications

1. Akshay Narayan, Frank Cangialosi, Deepti Raghavan, Prateesh Goyal, Srinivas Narayana, Radhika Mittal, Mohammad Alizadeh, Hari Balakrishnan. Restructuring Endpoint Congestion Control. To appear in *Proceedings of the ACM SIGCOMM 2018 Conference*, Budapest, Hungary, August 2018.

2. Behnam Montazeri, Yilong Li, Mohammad Alizadeh, John Ousterhout. Homa: A Receiver-Driven Low-Latency Transport Protocol Using Network Priorities. To appear in *Proceedings of the ACM SIGCOMM 2018 Conference*, Budapest, Hungary, August 2018.
3. Favyen Bastani, Songtao He, Mohammad Alizadeh, Hari Balakrishnan, Samuel Madden, Sanjay Chawla, Sofiane Abbar, and David DeWitt. RoadTracer: Automatic Extraction of Road Networks from Aerial Images. In *Proceedings of Computer Vision and Pattern Recognition (CVPR)*, Salt Lake City, UT, June 2018.
4. Hongzi Mao, Ravi Netravali, and Mohammad Alizadeh. Neural Adaptive Video Streaming with Pensieve. In *Proceedings of the ACM SIGCOMM 2017 Conference*, Los Angeles, CA, August 2017.
5. Srinivas Narayana, Anirudh Sivaraman, Vikram Nathan, Prateesh Goyal, Venkat Arun, Mohammad Alizadeh, Vimalkumar Jeyakumar, and Changhoon Kim. Language-Directed Hardware Design for Network Performance Monitoring. In *Proceedings of the ACM SIGCOMM 2017 Conference*, Los Angeles, CA, August 2017 (**Best paper**).
6. Sharad Chole, Andy Fingerhut, Sha Ma, Anirudh Sivaraman, Shay Vargaftik, Alon Berger, Gal Mendelson, Mohammad Alizadeh, Shang-Tse Chuang, Isaac Keslassy, Ariel Orda, and Tom Edsall. dRMT: Disaggregated Programmable Switching. In *Proceedings of the ACM SIGCOMM 2017 Conference*, Los Angeles, CA, August 2017.
7. Erico Vanini, Rong Pan, Mohammad Alizadeh, Parvin Taheri, and Tom Edsall. Let it Flow: Resilient Asymmetric Load Balancing with Flowlet Switching. In *Proceedings of the 14th USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, Boston, MA, March 2017.
8. Anirudh Sivaraman, Suvinay Subramanian, Mohammad Alizadeh, Sharad Chole, Shang-Tse Chuang, Anurag Agrawal, Hari Balakrishnan, Tom Edsall, Sachin Katti, and Nick McKeown. Programmable Packet Scheduling at Line Rate. In *Proceedings of the ACM SIGCOMM 2016 Conference*, Florianopolis, Brazil, August 2016.
9. Anirudh Sivaraman, Alvin Cheung, Mihai Budiu, Changhoon Kim, Mohammad Alizadeh, Hari Balakrishnan, George Varghese, Nick McKeown, and Steve Licking. Packet Transactions: High-Level Programming for Line-Rate Switches. In *Proceedings of the ACM SIGCOMM 2016 Conference*, Florianopolis, Brazil, August 2016.
10. Kanthi Nagaraj, Dinesh Bharadia, Hongzi Mao, Sandeep Chinchali, Mohammad Alizadeh, and Sachin Katti. NUMFabric: Fast and Flexible Bandwidth Allocation in Datacenters. In *Proceedings of the ACM SIGCOMM 2016 Conference*, Florianopolis, Brazil, August 2016.
11. Li Chen, Kai Chen, Wei Bai, and Mohammad Alizadeh. Scheduling Mix-flows in Commodity Datacenters with Karuna. In *Proceedings of the ACM SIGCOMM 2016 Conference*, Florianopolis, Brazil, August 2016.
12. Shaileshh Bojja Venkatakrishnan, Mohammad Alizadeh, and Pramod Viswanath. Costly Circuits, Submodular Schedules and Approximate Carathéodory Theorems. In *Proceedings of the 2016 ACM SIGMETRICS International Conference on Measurement and Modeling of Computer Science*, Antibes Juan-les-Pins, France, June 2016.

13. Yilong Geng, Vimalkumar Jeyakumar, Abdul Kabbani, and Mohammad Alizadeh. Juggler: a practical reordering resilient network stack for datacenters. In *Proceedings of the 11th European Conference on Computer Systems (EuroSys)*, London, UK, April 2016.
14. Asaf Cidon, Assaf Eisenman, Mohammad Alizadeh, and Sachin Katti. Cliffhanger: scaling performance cliffs in web memory caches. In *Proceedings of the 13th USENIX Symposium on Networked Systems Design and Implementation (NSDI)*, Santa Clara, CA, March 2016.
15. Mohammad Alizadeh, Tom Edsall, Sarang Dharmapurikar, Ramanan Vaidyanathan, Kevin Chu, Andy Fingerhut, Vinh The Lam, Francis Matus, Rong Pan, Navindra Yadav, and George Varghese. CONGA: Distributed Congestion-aware Load Balancing for Datacenters. In *Proceedings of the ACM SIGCOMM 2014 Conference*, Chicago, IL, August 2014 (**Best paper**).
16. Vimalkumar Jeyakumar, Mohammad Alizadeh, Yilong Geng, Changhoon Kim, and David Mazières. Millions of Little Minions: Using Packets for Low Latency Network Programming and Visibility. In *Proceedings of the ACM SIGCOMM 2014 Conference*, Chicago, IL, August 2014.
17. Mohammad Alizadeh, Shuang Yang, Milad Sharif, Sachin Katti, Nick McKeown, Balaji Prabhakar, and Scott Shenker. pFabric: Minimal Near-optimal Datacenter Transport. In *Proceedings of the ACM SIGCOMM 2013 Conference*, Hong Kong, China, August 2013.
18. Mohammad Alizadeh and Tom Edsall. On the Data Path Performance of Leaf-Spine Datacenter Fabrics. In *Proceedings of the 2013 IEEE 21st Annual Symposium on High-Performance Interconnects (HOTI)*, San Jose, CA, August 2013.
19. Vimalkumar Jeyakumar, Mohammad Alizadeh, David Mazières, Balaji Prabhakar, Changhoon Kim, and Albert Greenberg. EyeQ: Practical Network Performance Isolation at the Edge. In *Proceedings of the 10th USENIX Conference on Networked Systems Design and Implementation (NSDI)*, Lombard, IL, April 2013.
20. Mohammad Alizadeh, Adel Javanmard, Shang-Tse Chuang, Sundar Iyer, and Yi Lu. Versatile Refresh: Low Complexity Refresh Scheduling for High-throughput Multi-banked eDRAM. In *Proceedings of the 12th ACM SIGMETRICS/PERFORMANCE Joint International Conference on Measurement and Modeling of Computer Systems*, London, England, June 2012.
21. Mohammad Alizadeh, Abdul Kabbani, Tom Edsall, Balaji Prabhakar, Amin Vahdat, and Masato Yasuda. Less is More: Trading a Little Bandwidth for Ultra-low Latency in the Data Center. In *Proceedings of the 9th USENIX Conference on Networked Systems Design and Implementation (NSDI)*, San Jose, CA, April 2012.
22. Mohammad Alizadeh, Adel Javanmard, and Balaji Prabhakar. Analysis of DCTCP: Stability, Convergence, and Fairness. In *Proceedings of the ACM SIGMETRICS Joint International Conference on Measurement and Modeling of Computer Systems*, San Jose, CA, June 2011.
23. Mohammad Alizadeh, Abdul Kabbani, Berk Atikoglu, and Balaji Prabhakar. Stability Analysis of QCN: The Averaging Principle. In *Proceedings of the ACM SIGMETRICS Joint International Conference on Measurement and Modeling of Computer Systems*, San Jose, CA, June 2011.
24. Mohammad Alizadeh, Albert Greenberg, David A. Maltz, Jitendra Padhye, Parveen Patel, Balaji Prabhakar, Sudipta Sengupta, and Murari Sridharan. Data Center TCP (DCTCP).

In *Proceedings of the ACM SIGCOMM 2010 Conference*, New Delhi, India, August 2010.

25. Abdul Kabbani, Mohammad Alizadeh, Masato Yasuda, Rong Pan, and Balaji Prabhakar. AF-QCN: Approximate Fairness with Quantized Congestion Notification for Multi-tenanted Data Centers. In *Proceedings of the 2010 18th IEEE Symposium on High Performance Interconnects (HOTI)*, Washington, DC, August 2010.

Workshop Publications

1. Akshay Narayan, Frank Cangialosi, Prateesh Goyal, Srinivas Narayana, Mohammad Alizadeh, and Hari Balakrishnan. The Case for Moving Congestion Control Out of the Datapath. In *Proceedings of the 16th ACM Workshop on Hot Topics in Networks (HotNets)*, Palo Alto, CA, November 2017.
2. Prateesh Goyal, Mohammad Alizadeh, and Hari Balakrishnan. Rethinking Congestion Control for Cellular Networks. In *Proceedings of the 16th ACM Workshop on Hot Topics in Networks (HotNets)*, Palo Alto, CA, November 2017.
3. Hongzi Mao, Mohammad Alizadeh, Ishai Menache, and Srikanth Kandula. Resource Management with Deep Reinforcement Learning. In *Proceedings of the 15th ACM Workshop on Hot Topics in Networks (HotNets)*, Atlanta, GA, November 2016.
4. Srinivas Narayana, Anirudh Sivaraman, Vikram Nathan, Mohammad Alizadeh, David Walker, Jennifer Rexford, Vimalkumar Jeyakumar, and Changhoon Kim. Hardware-Software Co-Design for Network Performance Measurement. In *Proceedings of the 15th ACM Workshop on Hot Topics in Networks (HotNets)*, Atlanta, GA, November 2016.
5. Anirudh Sivaraman, Suvinay Subramanian, Anurag Agrawal, Sharad Chole, Shang-Tse Chuang, Tom Edsall, Mohammad Alizadeh, Sachin Katti, Nick McKeown, and Hari Balakrishnan. Towards Programmable Packet Scheduling. In *Proceedings of the 14th ACM Workshop on Hot Topics in Networks (HotNets)*, Philadelphia, PA, November 2015.
6. Lavanya Jose, Lisa Yan, Mohammad Alizadeh, George Varghese, Nick McKeown, and Sachin Katti. High Speed Networks Need Proactive Congestion Control. In *Proceedings of the 14th ACM Workshop on Hot Topics in Networks (HotNets)*, Philadelphia, PA, November 2015.
7. Asaf Cidon, Assaf Eisenman, Mohammad Alizadeh, and Sachin Katti. Dynacache: Dynamic Cloud Caching. In *Proceedings of the 7th USENIX Workshop on Hot Topics in Cloud Computing (HotCloud)*, Santa Clara, CA, July 2015.
8. Vimalkumar Jeyakumar, Mohammad Alizadeh, Changhoon Kim, and David Mazières. Tiny Packet Programs for Low-latency Network Control and Monitoring. In *Proceedings of the 12th ACM Workshop on Hot Topics in Networks (HotNets)*, College Park, MD, November 2013.
9. Mohammad Alizadeh, Shuang Yang, Sachin Katti, Nick McKeown, Balaji Prabhakar, and Scott Shenker. Deconstructing Datacenter Packet Transport. In *Proceedings of the 11th ACM Workshop on Hot Topics in Networks (HotNets)*, Redmond, WA, October 2012.
10. Vimalkumar Jeyakumar, Mohammad Alizadeh, David Mazières, Balaji Prabhakar, and Changhoon Kim. EyeQ: Practical Network Performance Isolation for the Multi-tenant Cloud. In *Proceed-*

ings of the 4th USENIX Conference on Hot Topics in Cloud Computing (HotCloud), Boston, MA, June 2012.

Invited Papers

1. Mohammad Alizadeh, Berk Atikoglu, Abdul Kabbani, Ashvin Lakshminantha, Rong Pan, Balaji Prabhakar, and Mick Seaman. Data center transport mechanisms: Congestion control theory and IEEE standardization. In *Proceedings of the 46th Annual Allerton Conference on Communication, Control, and Computing*, Urbana-Champaign, IL, September 2008.

Invited Presentations

1. Fast and Smart Network Resource Management for Datacenters and Beyond, *ACM CoNEXT Keynote*, December 2017, Seoul/Incheon, South Korea.
2. Fast and Smart Network Resource Management for Datacenters and Beyond, *Future Internet Summit (FIS) Keynote*, December 2017, Seoul, South Korea.
3. Fast and Smart Network Resource Management for Datacenters and Beyond, *Yale University*, November 2017, New Haven, CT.
4. dRMT: Disaggregated Programmable Switching, *Cisco SDN/P4 PI summit*, May 2017, San Jose, CA.
5. Fast and Smart Network Resource Management for Datacenters and Beyond, *Stanford University*, April 2017, Stanford, CA.
6. How programmable switches will change datacenter networks, *Microsoft Research Faculty Summit*, July 2016, Redmond, MA.
7. Programming Line-Rate Routers, *2016 CSAIL Annual Retreat*, June 2016, Chatham, MA.
8. Programming Line-Rate Routers, *Cisco SDN/P4 PI Summit*, May 2016, San Jose, CA.
9. Programmable Packet Scheduling at Line Rate, *P4 Workshop 2016*, May 2016, Stanford, CA.
10. CONGA: Distributed Congestion-Aware Load Balancing for Datacenters, *NetflixU Seminar*, June 2015, Los Gatos, CA.
11. CONGA: Distributed Congestion-Aware Load Balancing for Datacenters, *Stanford Networking Seminar*, April 2015, Stanford, CA.
12. CONGA: Distributed Congestion-Aware Load Balancing for Datacenters, *Cisco Meraki Tech Talk*, November 2014, San Francisco, CA.
13. CONGA: Distributed Congestion-Aware Load Balancing for Datacenters, *Cisco Research Center nth Dimension Research Talk*, November 2014, San Jose, CA.
14. CONGA: Distributed Congestion-Aware Load Balancing for Datacenters, *Facebook Tech Talk*, September 2014, Menlo Park, CA.
15. CONGA: Distributed Congestion-Aware Load Balancing for Datacenters, *SIGCOMM Conference*, August 2014, Chicago, IL.

16. Curbing Delays in Datacenters: Need Time to Save Time? *Allerton Conference*, October 2013, Urbana Champaign, IL.
17. On the Data Path Performance of Leaf-Spine Datacenter Fabrics, *Hot Interconnects Conference*, August 2013, San Jose, CA.
18. pFabric: Minimal Near-Optimal Datacenter Transport, *SIGCOMM Conference*, August 2013, Hong Kong, China.
19. pFabric: Minimal Near-Optimal Datacenter Transport, *Google Tech Talk*, July 2013, Mountain View, CA.
20. pFabric: Minimal Near-Optimal Datacenter Transport, *Stanford Experimental Data Center Lab (SEDCL) Retreat*, June 2013, Half Moon Bay, CA.
21. Transport in Future Warehouse-Scale Computers, *Microsoft Research Tech Talk*, October 2012, Redmond, WA.
22. Deconstructing Datacenter Packet Transport, *HotNets Workshop*, October 2012, Redmond, WA.
23. Packet Transport Mechanisms for Data Center Networks, *Cloud Tech Conference*, October 2012, Mountain View, CA.
24. Versatile Refresh: Low Complexity Refresh Scheduling for High Throughput Multi-banked eDRAM, *SIGMETRICS Conference*, June 2012, London, UK.
25. Less is More: Trading a little Bandwidth for Ultra-Low Latency in the Data Center, *NSDI Conference*, April 2012, San Jose, CA.
26. Packet Transport Mechanisms for Data Center Networks, *Stanford Networking Seminar*, April 2012, Stanford, CA.
27. HULL: High bandwidth, Ultra Low-Latency Data Center Fabrics, *UC Berkeley Cloud Seminar*, March 2012, Berkeley, CA.
28. Analysis of DCTCP: Stability, Convergence, and Fairness, *SIGMETRICS Conference*, June 2011, San Jose, CA.
29. Stability Analysis of QCN: The Averaging Principle, *SIGMETRICS Conference*, June 2011, San Jose, CA.
30. DCTCP and Ultra Low Latency Networking, *Stanford Experimental Data Center Lab (SEDCL) Retreat*, June 2011, Sausalito, CA.
31. Data Center TCP (DCTCP), *Stanford University DCTCP Workshop*, December 2010, Stanford, CA.
32. Data Center TCP (DCTCP), *SIGCOMM Conference*, August 2010, New Delhi, India.