Naveen Kumar Sharma

Contact Information

Software Engineer
Network Infrastructure
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Education

University of Washington — Seattle, WA
Ph.D. in Computer Science & Engineering — August 2019
Advisor: *Arvind Krishnamurthy*

University of Washington — Seattle, WA
M.S. in Computer Science & Engineering — June 2014
Advisors: *Steven D. Gribble and Dan R. K. Ports*

Indian Institute of Technology, Kharagpur — Kharagpur, India
B.Tech (Hons.) + M.Tech in Computer Science & Engineering — May 2012
Advisor: *Niloy Ganguly*

Interests

Networking, Distributed Systems, and Low-latency Datacenter Applications

Research

Building Efficient Network Protocols Using Programmable Switches
Historically, computer networks have been designed to have most of the complexity at the end-hosts, while switches connecting them are simple forwarding pipes understanding a fixed set of protocols. We explore various techniques to overcome limitations of programmable switches and implement efficient network protocols that rely on both flexible computation and packet scheduling inside the network.

Network Resource Allocation using Flexible Packet Processsing
Recent switch hardware proposals make it feasible to perform flexible packet processing inside the network. This lets operators configure switches to parse and process custom packets headers using flexible match+action tables allowing more control and insight over how packets are processed and routed. We explore key design principles to tackle the network resource allocation problem within data centers.

Predictable Tail-Latency Systems
Modern datacenter applications struggle with the need to access thousands of servers while still providing a fast response time, where the user's overall request latency depends on the slowest sub-request. This makes it important to design network services that offer not just low latency but predictable tail latency. We study sources of tail latencies and develop techniques for building systems that offer predictable response time.

Work Experience

Cavium, Inc. – *Software Research Intern* — San Jose, CA
Mentor: *Kishore Atreya* — Jun - Sep 2017
- Designed and prototyped a fair-queueing algorithm for Cavium XPliant switches.

Google, Inc. – *Software Engineering Intern* — Kirkland, WA
Mentors: *Nick Kline, Atul Adya* — Jun - Sep 2013
- Implemented a black-box performance testing system for Thialfi notification system.

Max Planck Institute for Software Systems – *Research Intern* — Saarbrücken, Germany
Mentor: *Krishna P. Gummadi* — May - August 2011
- Designed and implemented a people search service for Twitter social network.

University of Toronto – *Research Intern* — Ontario, Canada
Mentor: *Yashar Ganjali* — May - July 2010
- Designed an Android application to analyze phone calls and provide spam ratings.

Cranfield University – *Research Intern* — Shrivenham, UK
Mentor: *Shaun A. Forth* — May - July 2009
- Developed MATLAB libraries for high performance Algorithmic Differentiation.

Conference Publications

Adriana Szekeres, Michael Whittaker, Jialin Li, **Naveen Kr. Sharma**, Arvind Krishnamurthy, Dan R. K. Ports and Irene Zhang *Meerkat: Multicore-Scalable Replicated Transactions Following the Zero-Coordination Principle.* Proceedings of the European Conference on Computer Systems (EuroSys), 2020.

Naveen Kr. Sharma, Chenxingyu Zhao, Ming Liu, Pravein Govindan, Changhoon Kim, Arvind Krishnamurthy and Anirudh Sivaraman *Programmable Calendar Queues for Packet Scheduling.* Proceedings of the USENIX Symposium on Networked Systems Design and Implementation (NSDI), 2020.

Antoine Kaufmann, Tim Stamler, Simon Peter, **Naveen Kr. Sharma**, Arvind Krishnamurthy and Thomas Anderson *TAS: TCP Acceleration as an OS Service.* Proceedings of the European Conference on Computer Systems (EuroSys), 2019.

Naveen Kr. Sharma, Ming Liu, Kishore Atreya and Arvind Krishnamurthy, *Approximating Fair Queueing on Reconfigurable Switches.* Proceedings of the USENIX Symposium on Networked Systems Design and Implementation (NSDI), 2018.

Ellis Michael, Dan R. K. Ports, **Naveen Kr. Sharma** and Adriana Szekeres, *Recovering Shared Objects Without Stable Storage.* Proceedings of the International Symposium on Distributed Computing (DISC), 2017.

Naveen Kr. Sharma, Antoine Kaufmann, Thomas Anderson, Changhoon Kim, Arvind Krishnamurthy, Jacob Nelson and Simon Peter, *Evaluating the Power of Flexible Packet Processing for Network Resource Allocation.* Proceedings of the USENIX Symposium on Networked Systems Design and Implementation (NSDI), 2017.

Jialin Li, Ellis Michael, **Naveen Kr. Sharma**, Adriana Szekeres and Dan R. K. Ports, *Just Say NO to Paxos Overhead: Replacing Consensus with Network Ordering.* Proceedings of the USENIX Symposium on Operating Systems Design and Implementation (OSDI), 2016.

Antoine Kaufmann, Simon Peter, **Naveen Kr. Sharma**, Thomas Anderson and Arvind Krishnamurthy, *High Performance Packet Processing with FlexNIC.* Proceedings of International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 2016.

Irene Zhang, **Naveen Kr. Sharma**, Adriana Szekeres, Arvind Krishnamurthy and Dan R. K. Ports, *Building Consistent Transactions with Inconsistent Replication.* Proceedings of the ACM Symposium on Operating Systems Principles (SOSP), 2015.

Dan R. K. Ports, Jialin Li, Vincent Liu, **Naveen Kr. Sharma** and Arvind Krishnamurthy, *Designing Distributed Systems Using Approximate Synchrony in Data Center Networks.* Proceedings of the USENIX Symposium on Networked Systems Design and Implementation (NSDI), 2015. **(Best Paper Award)**

Jialin Li, **Naveen Kr. Sharma**, Dan R. K. Ports, Steven D. Gribble, *Tales of the Tail: Hardware, OS, and Application-level Sources of Tail Latency.* Proceedings of the Symposium on Cloud Computing (SOCC), 2014.

Saptarshi Ghosh, Muhammad Bilal Zafar, Parantapa Bhattacharya, **Naveen Sharma**, Niloy Ganguly, and Krishna P. Gummadi, *On Sampling the Wisdom of Crowds: Random vs. Expert Sampling of the Twitter Stream.* Proceedings of the International Conference on Information and Knowledge Management (CIKM), 2013.

Saptarshi Ghosh, **Naveen Sharma**, Fabricio Benevenuto, Niloy Ganguly and Krishna P. Gummadi, *Cognos: Crowdsourcing Search for Topic Experts in Microblogs.* Proceedings of the ACM SIGIR Conference, 2012.

Saptarshi Ghosh, Bimal Viswanath, Farshad Kooti, **Naveen Sharma**, Gautam Korlam, Fabricio Benevenuto, Niloy Ganguly and Krishna P. Gummadi, *Understanding and Combating Link Farming in the Twitter Social Network.* Proceedings of the World Wide Web Conference (WWW), 2012.

Saptarshi Ghosh, Avishek Banerjee, **Naveen Sharma**, Sanket Agarwal, Animesh Mukherjee and Niloy Ganguly, *Structure and Evolution of the Indian Railway Network.* Proceedings of the Summer Solstice International Conference on Discrete Models of Complex Systems, 2010.

Gautam Kumar, **Naveen Kumar Sharma** and Partha Bhowmick, *Creating Wheel-thrown Potteries in Digital Space.* Proceedings of International Conference on Arts and Technology (ArtsIT), 2009.

Journal Publications

Irene Zhang, **Naveen Kr. Sharma**, Adriana Szekeres, Arvind Krishnamurthy and Dan R. K. Ports, *Building Consistent Transactions with Inconsistent Replication.* ACM Transactions on Computer Systems, Vol. 35, Issue 4, Article 12, December 2018.

Irene Zhang, **Naveen Kr. Sharma**, Adriana Szekeres, Arvind Krishnamurthy and Dan R. K. Ports, *When Is Operation Ordering Required in Replicated Transactional Storage?* IEEE Data Engineering Bulletin, Vol. 39,

Issue 1, March 2016.

Gautam Kumar, **Naveen Kr. Sharma** and Partha Bhowmick, *Wheel-throwing in Digital Space using Number-Theoretic Approach.* International Journal of Arts and Technology, Vol. 4, Issue 2, April 2011.

Saptarshi Ghosh, Avishek Banerjee, **Naveen Kr. Sharma**, Sanket Agarwal, Niloy Ganguly, Saurav Bhattacharya and Animesh Mukherjee, *Statistical Analysis of the Indian Railway Network: a Complex Network Approach.* Acta Physica Polonica B Proceedings Supplement, Vol. 4, Issue 2, April 2011.

Workshop Publications

Naveen Sharma, Saptarshi Ghosh, Fabricio Benevenuto, Niloy Ganguly and Krishna P. Gummadi, *Inferring Who-is-Who in the Twitter Social Network.* Proceedings of the Workshop on Online Social Networks (WOSN), 2012.

Joydeep Chandra, Sascha Delitzscher, Niloy Ganguly, Ashish Jhunjhunwala, Tyll Krueger and **Naveen Sharma**, *Optimizing Topology in BitTorrent Based Networks.* Proceedings of the IEEE INFOCOMM Workshop on Network Science for Communication Networks (NetSciCom), 2011.

Shaun A. Forth and **Naveen Kr. Sharma**, *A sparse matrix approach to reverse mode automatic differentiation in MATLAB.* Proceedings of the ICCS Workshop on Automated Program Generation for Computational Science, 2010.

Awards

UW CSE Industrial Affiliates Madrona Prize Runner Up	2015, 2016
NSDI Best Paper Award	2015
Computer Science and Engineering Research Fellowship, University of Washington	2012
Best Masters Thesis, Computer Science & Engineering Department, IIT Kharagpur	2012
Max Planck Institute for Software Systems - Summer Fellowship	2011, 2012
Winners of **Hack-U** organised by Yahoo! at IIT Kharagpur	2011
MITACS Globalink Scholar at University of Toronto, Canada	2010
Certificate of Merit in National Physics & Chemistry Olympiad (**top 1%** of all candidates)	2007
Certificate of Merit in *Science and Technology* for being placed among **top 0.1%** in AISSE	2005
National Talent Search Examination (NTSE) Scholar	2005
All India Second Runner-Up in Green Olympiad	2004

Service

Program Committee

APNet, PaPoC	2022
ANCS, EuroDW	2021

Reviewer

IEEE/ACM Transactions on Networking (ToN)	2018

Teaching Experience

Computer Networks (CSE461) — Fall 2016
Tutor, CSE, University of Washington

Graduate Systems (CSE550) — Fall 2015
Teaching Assistant, CSE, University of Washington

PMP Operating Systems (CSEP551) — Fall 2014
Teaching Assistant, CSE, University of Washington

Operating Systems (CS30002) — Spring 2012
Teaching Assistant, CSE, IIT Kharagpur

Computer Networks (CS40001) — Fall 2011
Teaching Assistant, CSE, IIT Kharagpur