Brent E. Stephens

Contact Information

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Research Interests

Data Center Networking, In-Network Computing, Operating Systems, Distributed Systems, RDMA, Flow Control, Transport Protocols, Virtualization, Computer Architecture

Education

Rice University, Houston, Texas USA
George R. Brown School of Engineering

Ph.D., Computer Science, Dec 2015
- Thesis Topic: "Handling Congestion and Routing Failures in Data Center Networking"
- Advisors: Alan L. Cox and Scott Rixner

M.S., Computer Science, May 2012
- Thesis Topic: "Designing Scalable Networks for Future Large Datacenters"
- Advisors: Alan L. Cox and Scott Rixner

B.S., Electrical Engineering, May 2009
- GPA in Major: 3.94/4.00

Grants, Honors, and Awards

NSF Award #2202026: "CCRI: Planning-C: TopoCloud: A New Community Testbed With Unique Network Topology Flexibility." Investigators: B. Stephens (PI), R. Ricci. Amount: $91,256 over 1 year. Date: June, 2022.

NSF Award #2008273: "CNS Core: Small: Network-wide Policy Enforcement in Programmable Networks using Logical Queues." Investigators: B. Stephens (PI), B. Vamanan. Amount: $250,000 out of $499,999 total over 3 years. Date: August, 2020. https://www.nsf.gov/awardsearch/showAward?AWD_ID=2008273

NSF Award #1942686: "CAREER: NIC-Accelerated Active Messaging as a Generic Replacement for RDMA." Investigators: B. Stephens (PI). Amount: $500,000 over 5 years. Date: February, 2020. https://www.nsf.gov/awardsearch/showAward?AWD_ID=1942686

NSF Award #1850053: "CRII: NeTS: Rethinking Flow Control for Cloud Data Center Networks." Investigators: B. Stephens (PI). Amount: $175,000 over 2 years. Date: May 2019. https://www.nsf.gov/awardsearch/showAward?AWD_ID=1850053

Google Faculty Research Award, 2018. Investigators: B. Stephens (PI). Amount: $75,000 total.

IBM Ph.D. Fellowship, 2012 - 2014

Texas Instruments Fellowship, August 2009 - August 2015

Rice University: Graduated Magna Cum Laude, May 2009

Professional Experience

University of Utah, Salt Lake City, Utah USA
Adjunct Professor — **June 2023 - present**
Research Assistant Professor — **August 2021 - May 2023**

Systems Research @ Google, Seattle, Washington USA
Research Scientist and Software Engineer — **May 2022 - present**

University of Illinois at Chicago, Chicago, Illinois USA
Assistant Professor — **August 2018 - August 2021**

University of Wisconsin, Madison, Madison, Wisconsin USA
Post-doctoral Research Associate — **September 2015 - July 2018**
Researched novel abstractions for Operating Systems and NICs to schedule network traffic.

Rice University, Houston, Texas USA
Research Assistant — **August 2009 - August 2015**
Designed scalable Ethernet replacements and deadlock-free and fault-tolerant routing algorithms.
Graduate Teaching Assistant — **August 2009 - May 2012**
Given the distinction: "With approval of Dean of Engineering."

Undergraduate Teaching Assistant **August 2006 - May 2007**
Led weekly recitation sections for two different introductory computer science courses.

IBM Research, Austin, TX USA
Research Intern **May 2011 – September 2011, July 2012 – September 2012, July 2013 – October 2013**
- Manager: John Carter

Intel Corporation, Hillsboro, Oregon USA
Software Development Intern **May 2008 - August 2008**

ViaSat Inc., Carlsbad, California USA
Hardware Development Intern **May 2007 - August 2007**

Professional Activities

NSF Review Panelist: 1 panel in 2021, 1 panel in 2019, 1 panel in 2016, and 1 panel in 2015.

Conference Program Committee Member: USENIX NSDI 2023, USENIX NSDI 2022, ACM SIGCOMM 2021, ACM CoNEXT 2021, ACM SOSR 2021, ACM/IEEE ANCS 2021, ACM SOSR 2020, ACM/IEEE ANCS 2019, USENIX ATC 2018, ACM APNet 2018.

Professional Organization Memberships: USENIX (2016 - Present), ACM (2016 - Present).

Selected Publications

H. N. Schuh, A. Krishnamurthy, D. E. Culler, H. M. Levy, L. Rizzo, S. Khan, B. E. Stephens. "CC-NIC: A Cache-Coherent Interface to the NIC", in *ASPLOS 2024*.

T. Ji, D. Saxena, B. E. Stephens, A. Akella. "Yama: Providing Performance Isolation for Black-Box Offloads", in *SoCC 2023*.

K. Seemakhupt, B. E Stephens, S. Khan, S. Liu, H. Wassel, S. H. Yeganeh, A. C. Snoeren, A. Krishnamurthy, D. E. Culler, H. M. Levy. "A Cloud-Scale Characterization of Remote Procedure Calls", in *SOSP 2023*.

J. Lin, A. Cardoza, T. Khan, Y. Ro, B. E. Stephens, H Wassel, A. Akella. "Ringleader: Efficiently Offloading Intra-Server Orchestration to NICs", in *NSDI 2023*.

A. Sanaee, F. Shahinfar, B. E. Stephens, G. Antichi, "Backdraft: a Lossless Virtual Switch that Prevents the Slow Receiver Problem", in *NSDI 2022*.

Y. Zhang, Y. Tan, B. E. Stephens, M. Chowdhury, "Justitia: Software Multi-Tenancy in Hardware Kernel-Bypass Networks", in *NSDI 2022*.

B. E. Stephens, D. Grassi, H Almasi, B Vamanan, A Akella, "TCP is Harmful to In-Network Computing: Designing a Message-Oriented Transport Protocol (MTP)", in *HotNets 2021*.

V. S. Thapeta, K. Shinde, M. Malekpourshahraki, D. Grassi, B. Vamanan, B. E. Stephens, "Nimble: Scalable TCP-Friendly Programmable In-Network Rate-Limiting", in *SOSR 2021*.

J. Lin, K. Patel, B. E. Stephens, A. Sivaraman, A. Akella, "PANIC: A Programmable High-Performance NIC for Multi-tenant Networks", in *OSDI 2020*.

Y. Le, M. Malekpourshahraki, B. Stephens, A. Akella, and M. Swift, "On the Impact of Cluster Configuration on RoCE Application Design", in *APNet 2019*. *Best Paper Award*

M. Malekpourshahraki, B. Stephens, B. Vamanan, "Ether: Providing both Interactive Service and Fairness in Multi-Tenant Datacenters", in *APNet 2019*.

B. Stephens, A. Akella, M. Swift. "Loom: Flexible and Efficient NIC Packet Scheduling." *NSDI 2019*.

B. Stephens, A. Akella, M. Swift. "Your Programmable NIC Should be a Programmable Switch." *HotNets 2018*.

Y. Le, B. Stephens, A. Singhvi, A. Akella, M. Swift. "RoGUE: RDMA over Generic Unconverged Ethernet." *SoCC 2018*.

K. He, W. Qin, Q. Zhang, W. Wu, J. Yang, T. Pan, C. Hu, J. Zhang, B. Stephens, A. Akella, and

Y. Zhang. "Low Latency Software Rate Limiters for Cloud Networks." *APNet 2017*.

B. Stephens, A. Singhvi, A. Akella, and M. Swift. "Titan: Fair Packet Scheduling for Commodity Multiqueue NICs." *USENIX ATC 2017*.

B. Stephens and A.L. Cox. "Deadlock-Free Local Fast Failover for Arbitrary Data Center Networks." *INFOCOM 2016*.

B. Stephens, A.L. Cox, and S. Rixner. "Scalable Multi-Failure Fast Failover via Forwarding Table Compression." *SOSR 2016*.

J. Rasley, B. Stephens, C. Dixon, E. Rozner, W. Felter, K. Agarwal, J. Carter, R. Fonseca. "Planck: Millisecond-scale Monitoring and Control for Commodity Networks." *SIGCOMM 2014*.

B. Stephens, A.L. Cox, A. Singla, J. Carter, C. Dixon, W. Felter. "Practical DCB for Improved Data Center Networks." *INFOCOM 2014*.

B. Stephens A.L. Cox, S. Rixner. "Plinko: Building Provably Resilient Forwarding Tables." *HotNets 2013*.

B. Stephens, A.L. Cox, W. Felter, C. Dixon, J. Carter. "PAST: Scalable Ethernet for Data Centers." *CoNEXT 2012*.

See Google Scholar for a complete publication list:
https://scholar.google.com/citations?user=REpY8JMAAAAJ