Sarah McClure

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SUMMARY

CS PhD candidate at UC Berkeley specializing in the **performance and scalability of networked systems for large-scale AI and cloud infrastructures**. My research applies **analytical modeling and systems design** to address fundamental bottlenecks in networked systems. I have developed networking tools currently in production in industry and lead an open-source project with contributors from **multiple major cloud providers**.

EDUCATION

University of California, Berkeley 2020 - Present
PhD in Computer Science
Advised by Sylvia Ratnasamy and Scott Shenker

The Pennsylvania State University 2016 - 2020
BS in Computer Engineering
Physics and Math Minors
Summa Cum Laude

CURRENT RESEARCH PROJECTS

Load Balancing for AI Workloads
Systematically evaluated AI fabric load-balancing designs, identifying packet spraying as the superior approach over flow-level methods. Developed Ofan, a novel switch-based implementation using destination-based rotation to achieve optimal O(1) queue scaling, significantly outperforming current industry standards under link failure and high utilization.

Analysis of AI Training Topologies
Developed a comprehensive analytical framework to derive performance lower bounds for collective communication in ML fabrics. Evaluated fat-tree Clos and Torus topologies across a wide range of operational constraints, including link failures, multicast, and job placement strategies, to quantify architectural trade-offs in accelerator-centric networks.

PUBLICATIONS

No Signal to Rule Them All: A Systematic Analysis of In-Network Congestion Signals
Sarah McClure, Nandita Dukkipati, Sylvia Ratnasamy, Scott Shenker
New Ideas in Networked Systems (NINeS) 2026

A Case for Learned Cloud Emulators
Archit Bhatnagar, Yiming Qui, **Sarah McClure**, Sylvia Ratnasamy, Ang Chen
ACM HotNets 2025

Invisinets: Removing Networking from Cloud Networks
Sarah McClure, Zeke Medley, Deepak Bansal, Karthick Jayaraman, Ashok Narayanan, Jitendra Padhye, Sylvia Ratnasamy, Anees Shaikh, and Rishabh Tewari
USENIX NSDI 2023

Bluebird: High-performance SDN for Bare-metal Cloud Services
Manikandan Arumugam, Deepak Bansal, Navdeep Bhatia, James Boerner, Simon Capper, Changhoon Kim, **Sarah McClure**, Neeraj Motwani, Ranga Narasimhan, Urvish Panchal, Tommaso Pimpo, Ariff Premji, Pranjal Shrivastava, and Rishabh Tewari
USENIX NSDI 2022

Efficient Scheduling Policies for Microsecond-Scale Tasks
Sarah McClure, Amy Ousterhout, Scott Shenker, and Sylvia Ratnasamy
USENIX NSDI 2022

Rethinking Networking Abstractions for Cloud Tenants
Sarah McClure, Sylvia Ratnasamy, Deepak Bansal, and Jitendra Padhye
ACM HotOS 2021

Training UUV Navigation and Contact Avoidance with Reinforcement Learning
Eric Homan, Steven Davis, Kenneth Hall, **Sarah McClure**, John Sustersic, and Vijaykrishnan Narayanan
IEEE OCEANS 2019

INDUSTRY IMPACT

Paraglider (Linux Foundation Open-Source Project)
Lead the technical steering committee and development with members/contributors from Google, Microsoft, IBM, and UC Berkeley for the Paraglider project, an open-source implementation of the Invisinets research project.

TEACHING & MENTORSHIP

Head TA, *Introduction to the Internet: Architecture and Protocols (CS168)* — Spring 2024
Outstanding Graduate Student Instructor Award 2025

Discussion TA, *Introduction to the Internet: Architecture and Protocols (CS168)* — Fall 2022

Mentored **12** undergraduate and masters students across many projects. — 2020-Present
Mentees have gone on to PhD programs, OpenAI, Databricks, Google, Microsoft, Amazon, and more.

WORK EXPERIENCE

Software Engineering Intern — May 2020 - August 2020
Microsoft Azure — Redmond, WA
Developed initial prototype of **tenant network verification tool now in production on Azure**.

Software Engineer — October 2019 - April 2020
Microsoft Azure — Redmond, WA
Contributed part-time and remotely to extend existing verification service infrastructure for incident mitigation.

Undergraduate Researcher — October 2016 - May 2020
Applied Research Laboratory, The Pennsylvania State University — University Park, PA
Performed research related to autonomy and perception for robotic vehicles including passive sonar and learning methods.

Software Engineering Intern — May 2019 -August 2019
Microsoft Azure — Redmond, WA
Developed prototype of an extension to a network emulator to include physical devices by leveraging a custom dataplane.

LEADERSHIP & VOLUNTEERING

Committee Member, EECS Grad Student Association — 2022 - 2025
Captain, THON Technology Committee — April 2019 - April 2020
President, Association of Women in Computing — May 2018 - May 2019
Vice President, Association of Women in Computing — May 2017 - May 2018

HONORS & AWARDS

Outstanding Graduate Student Instructor Award, UC Berkeley — 2025
EECS Excellence Award, UC Berkeley — 2020
John W. White Graduate Fellowship, Pennsylvania State University — 2020