

Sara McAllister

PhD Candidate, Carnegie Mellon University

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Research Interests

Sara McAllister is a PhD candidate at Carnegie Mellon University, advised by Nathan Beckmann and Greg Ganger, expected to graduate in Summer 2025. She is interested in computer systems, particularly caching and storage systems. Her work includes a focus on improving efficiency and sustainability through hardware-software co-design and grounding design choices in mathematical modeling. Her work has appeared at OSDI and SOSP, including receiving a Best Paper Award at SOSP 2021 for her paper "Kangaroo: Caching Billions of Tiny Objects on Flash". Sara also strives to increase inclusion in computer science, including by creating a DEI course for CS PhD students. Due to these efforts, she was awarded CMU's Graduate Student Service Award in 2022 and a Best Paper Award at SIGCSE 2023.

Education

Carnegie Mellon University

PHD IN COMPUTER SCIENCE, ADVISORS: NATHAN BECKMANN AND GREG GANGER

Pittsburgh, PA

Aug 2019. - Present

Carnegie Mellon University

MASTERS IN COMPUTER SCIENCE RESEARCH

Pittsburgh, PA

Aug 2019. - May 2022

Harvey Mudd College

B.S. IN COMPUTER SCIENCE, GRADUATED WITH HIGH DISTINCTION

Claremont, CA

Aug. 2015 - May 2019

Honors and Awards

2023	Exemplary Poster Presentation , In computer and computational sciences at fellows conference	NDSEG
2023	Best Paper Award	SIGCSE
2022	Graduate Student Service Award , For the development of 15-996 CS-JEDI	CMU
2021	Best Paper Award	SOSP
2021	Graduate Fellowship , NDSEG	DoD
2021	Graduate Research Fellowship , GRFP	NSF
2019	Class of '94 Award , Outstanding CS graduate in a combination of course work, research, and service	Harvey Mudd
2019	Departmental Honors , Computer Science Department	Harvey Mudd
2019	Clinic Team Award , Outstanding performance on a team	Harvey Mudd
2019	Outstanding Undergraduate Researcher Award , Honorable Mention	CRA
2019	Best Malware , Most creative malware during capture the flag (CTF) competition	Yelp

Refereed Journal Publications

Kangaroo: Theory and Practice of Caching Billions of Tiny Objects on Flash

[Sara McAllister](#), Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu, Daniel S. Berger, Nathan Beckmann, Gregory R. Ganger

ACM ToS

August 2022

External-memory Dictionaries in the Affine and PDAM Models

Michael A. Bender, Alex Conway, Martin Farach-Colton, William Jannen, Yizheng Jiao, Rob Johnson, Eric Knorr, [Sara McAllister](#), Nirjhar Mukherjee, Prashant Pandey, Donald E. Porter, Jun Yuan, Yang Zhan

ACM ToPC

September 2021

Refereed Conference Publications

CS-JEDI: Required DEI Education, by CS PhD Students, for CS PhD Students

Bailey Flanigan, Ananya Joshi, [Sara McAllister](#), Catalina Vajiac

🏆 SIGCSE 2023

Acceptance Rate: 35%

Kangaroo: Caching Billions of Tiny Objects on Flash

[Sara McAllister](#), Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu, Daniel S. Berger, Nathan Beckmann, Gregory R. Ganger

🏆 SOSP 2021

Acceptance Rate: 16%

The CacheLib Caching Engine: Design and Experiences at Scale

Benjamin Berg, Daniel S. Berger, [Sara McAllister](#), Isaac Grosof, Sathya Gunasekar, Jimmy Lu, Michael Uhlar, Jim Carrig, Nathan Beckmann, Mor Harchol-Balter, Gregory R. Ganger

OSDI 2020

Acceptance Rate: 18%

Small Refinements to DAM Can Have Big Consequences for Data-Structure Design

Michael A. Bender, Alexander Conway, Martin Farach-Colton, William Jannen, Yizheng Jiao, Rob Johnson, Eric Knorr, [Sara McAllister](#), Nirjhar Mukherjee, Prashant Pandey, Donald E. Porter, Jun Yuan, Yang Zhan

SPAA 2019

Acceptance Rate: 40%

Talks and Posters

Efficient and Sustainable Data Retrieval

NDSEG Fellows, 31 July 2023

Overcoming Write Limitations to achieve Sustainable Flash Caching

University of Toronto, 20 Mar 2023

FairyWREN: A Superb Cache Co-optimized for Write-Limited Flash

PDL Retreat, 7 Nov 2022

Caching on Flash: Kangaroo and Beyond

Meta, 11 Mar 2022

Kangaroo: Caching Billions of Objects on Flash

Microsoft Research, 22 Nov 2021

Kangaroo: Caching Billions of Objects on Flash

SOSP, 27 Oct 2021

Building a Stronger, More Just Academic Community Through Mandatory Anti-bias Learning

UPitt Diversity Forum, 28 Jul 2021

Kangaroo: Caching Billions of Objects on Flash

Cache@Scale, 4 Mar 2021

Leadership and Service

CS-JEDI and Other DEI Initiatives

Developed and implemented inclusivity initiatives with 2 other PhD students including an informal climate survey, a mandatory DEI class for CS PhD students, an advisor-advisee feedback form, and being awarded CMU's Graduate Student Service Award

Carnegie Mellon University

July 2020 - Mar. 2023

PhD Admissions Committee

PhD student in charge of reading applications for systems area in the Computer Science Department

Carnegie Mellon University

Dec. 2021 - Mar. 2022

Parallel Data Lab (PDL) Meeting Coordinator

Invited and scheduled talks for PDL weekly talk series

Carnegie Mellon University

Fall 2021

Introductory Course (IC) Committee

Co-organizer for first virtual orientation in the Computer Science Department

Carnegie Mellon University

Fall 2020

Faculty Search - Student Committee

Interviewed each invited faculty candidate for the Computer Science Department

Harvey Mudd College

Spring 2019

Mentor and Proctor (Residential Assistant)

Led residential activities and crisis response in East Dorm with 82 residents

Harvey Mudd College

Fall 2016 - Spring 2019

Science Bus Volunteer and Treasurer

Instructed 4th and 5th graders from under-resourced schools in hands-on science lessons and managed ~\$3000 of grant money (April 2016 - May 2017)

Harvey Mudd College

Aug. 2015 - May 2018

STEAM:coders Site Coordinator and Instructor

Led CS-related activities for 25 middle-school ages students from disadvantaged communities

Harvey Mudd College

Summer 2016

Teaching

Carnegie Mellon University

Parallel Computer Architecture and Programming (15-418/618)

TA, Spring 2022

Diversity, Equity, and Inclusion in Computer Science and Society (15-996)

Co-Creator and TA, Spring 2021

Harvey Mudd College

Programming Languages (CS131)

Grader and Tutor, Spring 2019

Introduction to Computer Systems (CS105)

Grader and Tutor, Fall 2018

Introduction to Computer Systems (CS105)

Grader and Tutor, Spring 2018

Data Structures and Programming Development (CS70)

Grader and Tutor, Fall 2017

Principles of Computer Science (CS60)

Grader and Tutor, Spring 2017

Introduction to Biology and Computer Science (CS5 Green)

Grader and Tutor, Fall 2016

Invited Speaker

Computer Systems (CMU 18-213/613)

Fall 2022

Data Center Computing (CMU 18-847C)

Spring 2022

CS-JEDI: Intro to Justice, Equity, Diversity, and Inclusion in Computer Science (CMU 15-996)

Spring 2022

Computer Systems (CMU 18-213)

Fall 2021

Storage Systems (CMU 18-746)

Fall 2021

Mentoring

Yucong (Sherry) Wang (CMU ECE undergraduate student)
Akshath Karanam (CMU ECE masters student)
Priyal Suneja (University of Washington CS PhD student)
Julian Tutuncu-Macias (CMU CS undergraduate student)
Sheng Xu (CMU CS masters student)
Karina Mejia (Ontario High School)

Fall 2022 - Present
Fall 2022
Fall 2021 - Summer 2022
Fall 2019 - Spring 2021
Spring 2020
Summer 2016

Professional Experience

Graduate Research Assistant

ADVISORS: NATHAN BECKMANN AND GREG GANGER

- Researched caching systems to decrease cost and increase sustainability of providing internet services at scale
- Explored new memory and storage hardware interfaces, particularly for caching applications

Carnegie Mellon University

Aug. 2019 - Present

Research Intern

MENTOR: AMAR PHANISHAYEE

- Researched serving large generative ML models more efficiently

Microsoft Research

Summer 2022

Research Intern

MENTOR: DANIEL BERGER

- Researched in-kernel disaggregated memory solutions using CXL

Microsoft Research

Summer 2021

Software Engineering Intern

DATABASE TEAM

- Designed and implemented a Python library to manage MySQL database permissions
- Planned and started gradual roll out system, fully rolled out after internship across production

Yelp

Summer 2019

Clinic (Capstone) Project

SPONSORED BY PURE STORAGE

- Designed and implemented failover mechanisms for NFS VMs running on a two-controller system
- Technical lead, about file systems and network partitioning, on a team of 4

Harvey Mudd College

Aug. 2018 - May 2019

Undergraduate Research Assistant

ADVISOR: DON PORTER

- Investigated theoretical and experimental analysis of write-optimized dictionaries

UNC Chapel Hill

May 2018 - Aug. 2018

Software Engineering Intern

DEVELOPER EXPERIENCE TEAM

- Developed and tested a Python library to restart and repair development servers
- Created a React and Hack PHP user interface to receive and store user inputs

Facebook

Summer 2017

Research Assistant

ADVISOR: ANNA AHN

- Led data analysis of a three-legged walking study

Harvey Mudd College

May. 2016 - Jun. 2017