## Sara McAllister

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I research sustainable datacenters from a computer systems perspective, particularly focused on caching and storage systems. My work includes improves efficiency and sustainability through hardware-software co-design and grounding design in mathematical modeling. My work has appeared at OSDI and SOSP, including receiving a Best Paper Award at SOSP 2021. I am a 2021 NDSEG fellow, a 2023 EECS Rising Star, and a 2025 Siebel Scholar. For my service work, I was awarded CMU's Graduate Student Service Award in 2022 and a Best Paper Award at SIGCSE 2023.

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Harsh Desai*, Sara McAllister*, Nathan Beckmann, Brandon Lucia (* = co-first author)  CS-JEDI: Required DEI Education, by CS PhD Students, for CS PhD Students  Bailey Flanigan, Ananya Joshi, Sara McAllister, Catalina Vajiac  Cangaroo: Theory and Practice of Caching Billions of Tiny Objects on Flash  Bara McAllister, Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu,  Daniel S. Berger, Nathan Beckmann, Gregory R. Ganger	Harvey Mudd Clinic Team Award, for outstanding performance on an industry-sponsored team capstone project CRA Outstanding Undergraduate Researcher Award, Honorable Mention  Publications  FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces Gara McAllister, Yucong Wang, Benjamin Berg, Daniel S. Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  A Call for Research on Storage Emissions Gara McAllister, Fiodar Kazhamiaka, Daniel S. Berger, Rodrigo Fonseca, Kali Frost, Aaron Ogus, Maneesh Gah, Ricardo Bianchini, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger	2019 2019 OSDI 2024 Acceptance Rate: 18% HotCarbon 2024 Acceptance Rate: 46%
Railey Flanigan, Ananya Joshi, Sara McAllister, Catalina Vajiac  Kangaroo: Theory and Practice of Caching Billions of Tiny Objects on Flash  Bara McAllister, Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu,  Daniel S. Berger, Nathan Beckmann, Gregory R. Ganger	Harvey Mudd Clinic Team Award, for outstanding performance on an industry-sponsored team capstone project CRA Outstanding Undergraduate Researcher Award, Honorable Mention  Publications  FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces Gara McAllister, Yucong Wang, Benjamin Berg, Daniel S. Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  A Call for Research on Storage Emissions Gara McAllister, Fiodar Kazhamiaka, Daniel S. Berger, Rodrigo Fonseca, Kali Frost, Aaron Ogus, Maneesh Gah, Ricardo Bianchini, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  DéjàVu: KV-cache Streaming for Fast, Fault-tolerant Generative LLM Serving	2019 2019 OSDI 2024 Acceptance Rate: 18% HotCarbon 2024
Railey Flanigan, Ananya Joshi, Sara McAllister, Catalina Vajiac  Kangaroo: Theory and Practice of Caching Billions of Tiny Objects on Flash  Bara McAllister, Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu,  Daniel S. Berger, Nathan Beckmann, Gregory R. Ganger	Harvey Mudd Clinic Team Award, for outstanding performance on an industry-sponsored team capstone project CRA Outstanding Undergraduate Researcher Award, Honorable Mention  Publications  FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces  Gara McAllister, Yucong Wang, Benjamin Berg, Daniel S. Berger, George Amvrosiadis, Nathan Beckmann,  Gregory R. Ganger  A Call for Research on Storage Emissions  Gara McAllister, Fiodar Kazhamiaka, Daniel S. Berger, Rodrigo Fonseca, Kali Frost, Aaron Ogus, Maneesh  Gah, Ricardo Bianchini, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  DéjàVu: KV-cache Streaming for Fast, Fault-tolerant Generative LLM Serving  Fonteini Strati, Sara McAllister, Amar Phanishayee, Jakub Tarnawski, Ana Klimovic  Towards Understanding the Carbon Impact in End-to-end Sensing Pipelines	2019 2019 OSDI 2024 Acceptance Rate: 18% HotCarbon 2024 Acceptance Rate: 46% ICML 2024 Acceptance Rate: 27.5%
Sara McAllister, Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu, Daniel S. Berger, Nathan Beckmann, Gregory R. Ganger	Harvey Mudd Clinic Team Award, for outstanding performance on an industry-sponsored team capstone project CRA Outstanding Undergraduate Researcher Award, Honorable Mention  Publications  FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces Gara McAllister, Yucong Wang, Benjamin Berg, Daniel S. Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  A Call for Research on Storage Emissions Gara McAllister, Fiodar Kazhamiaka, Daniel S. Berger, Rodrigo Fonseca, Kali Frost, Aaron Ogus, Maneesh Gah, Ricardo Bianchini, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  DéjàVu: KV-cache Streaming for Fast, Fault-tolerant Generative LLM Serving Fonteini Strati, Sara McAllister, Amar Phanishayee, Jakub Tarnawski, Ana Klimovic  Towards Understanding the Carbon Impact in End-to-end Sensing Pipelines  Harsh Desai*, Sara McAllister*, Nathan Beckmann, Brandon Lucia (* = co-first author)	OSDI 2024 Acceptance Rate: 18% HotCarbon 2024 Acceptance Rate: 46% ICML 2024 Acceptance Rate: 27.5% HotEthics 2024
Sara McAllister, Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu, Daniel S. Berger, Nathan Beckmann, Gregory R. Ganger	Harvey Mudd Clinic Team Award, for outstanding performance on an industry-sponsored team capstone project CRA Outstanding Undergraduate Researcher Award, Honorable Mention  Publications  FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces Gara McAllister, Yucong Wang, Benjamin Berg, Daniel S. Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  A Call for Research on Storage Emissions Gara McAllister, Fiodar Kazhamiaka, Daniel S. Berger, Rodrigo Fonseca, Kali Frost, Aaron Ogus, Maneesh Gah, Ricardo Bianchini, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  DéjàVu: KV-cache Streaming for Fast, Fault-tolerant Generative LLM Serving Fonteini Strati, Sara McAllister, Amar Phanishayee, Jakub Tarnawski, Ana Klimovic  Towards Understanding the Carbon Impact in End-to-end Sensing Pipelines Harsh Desai*, Sara McAllister*, Nathan Beckmann, Brandon Lucia (* = co-first author)  CS-JEDI: Required DEI Education, by CS PhD Students, for CS PhD Students	OSDI 2024 Acceptance Rate: 18% HotCarbon 2024 Acceptance Rate: 46%
(angayou Caching Pillians of Tiny Chicets on Elach	Harvey Mudd Clinic Team Award, for outstanding performance on an industry-sponsored team capstone project CRA Outstanding Undergraduate Researcher Award, Honorable Mention  Publications  FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces Gara McAllister, Yucong Wang, Benjamin Berg, Daniel S. Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  A Call for Research on Storage Emissions Gara McAllister, Fiodar Kazhamiaka, Daniel S. Berger, Rodrigo Fonseca, Kali Frost, Aaron Ogus, Maneesh Gah, Ricardo Bianchini, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  DéjàVu: KV-cache Streaming for Fast, Fault-tolerant Generative LLM Serving Fonteini Strati, Sara McAllister, Amar Phanishayee, Jakub Tarnawski, Ana Klimovic  Flowards Understanding the Carbon Impact in End-to-end Sensing Pipelines Harsh Desai*, Sara McAllister*, Nathan Beckmann, Brandon Lucia (* = co-first author)  CS-JEDI: Required DEI Education, by CS PhD Students, for CS PhD Students Bailey Flanigan, Ananya Joshi, Sara McAllister, Catalina Vajiac	OSDI 2024  Acceptance Rate: 18%  HotCarbon 2024  Acceptance Rate: 46%  ICML 2024  Acceptance Rate: 27.5%  HotEthics 2024  \$\P\$ SIGCSE 2023  Acceptance Rate: 35%
varies on: Cachine Dillons of Tiny Objects on Flash	Publications FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces Gram McAllister, Yucong Wang, Benjamin Berg, Daniel S. Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  A Call for Research on Storage Emissions Gram McAllister, Fiodar Kazhamiaka, Daniel S. Berger, Rodrigo Fonseca, Kali Frost, Aaron Ogus, Maneesh Grah, Ricardo Bianchini, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  DéjàVu: KV-cache Streaming for Fast, Fault-tolerant Generative LLM Serving Gronteini Strati, Sara McAllister, Amar Phanishayee, Jakub Tarnawski, Ana Klimovic  Towards Understanding the Carbon Impact in End-to-end Sensing Pipelines Harsh Desai*, Sara McAllister*, Nathan Beckmann, Brandon Lucia (* = co-first author)  CS-JEDI: Required DEI Education, by CS PhD Students, for CS PhD Students Bailey Flanigan, Ananya Joshi, Sara McAllister, Catalina Vajiac  Kangaroo: Theory and Practice of Caching Billions of Tiny Objects on Flash Gara McAllister, Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu,	OSDI 2024 Acceptance Rate: 18% HotCarbon 2024 Acceptance Rate: 46% ICML 2024 Acceptance Rate: 27.5% HotEthics 2024
Gara McAllister, Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu,  Acceptance Rate	Publications FairyWREN: A Sustainable Cache for Emerging Write-Read-Erase Flash Interfaces Gram McAllister, Yucong Wang, Benjamin Berg, Daniel S. Berger, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  A Call for Research on Storage Emissions Gram McAllister, Fiodar Kazhamiaka, Daniel S. Berger, Rodrigo Fonseca, Kali Frost, Aaron Ogus, Maneesh Grah, Ricardo Bianchini, George Amvrosiadis, Nathan Beckmann, Gregory R. Ganger  DéjàVu: KV-cache Streaming for Fast, Fault-tolerant Generative LLM Serving Gronteini Strati, Sara McAllister, Amar Phanishayee, Jakub Tarnawski, Ana Klimovic  Towards Understanding the Carbon Impact in End-to-end Sensing Pipelines Harsh Desai*, Sara McAllister*, Nathan Beckmann, Brandon Lucia (* = co-first author)  CS-JEDI: Required DEI Education, by CS PhD Students, for CS PhD Students Bailey Flanigan, Ananya Joshi, Sara McAllister, Catalina Vajiac  Kangaroo: Theory and Practice of Caching Billions of Tiny Objects on Flash Gara McAllister, Benjamin Berg, Julian Tutuncu-Macias, Juncheng Yang, Sathya Gunasekar, Jimmy Lu,	OSDI 2024 Acceptance Rate: 18% HotCarbon 2024 Acceptance Rate: 46% ICML 2024 Acceptance Rate: 27.5% HotEthics 2024  *P SIGCSE 2023 Acceptance Rate: 35% ACM TOS

Daniel S. Berger, Nathan Beckmann, Gregory R. Ganger

External-memory Dictionaries in the Affine and PDAM Models	ACM ToPC
Michael A. Bender, Alex Conway, Martin Farach-Colton, William Jannen, Yizheng Jiao, Rob Johnson, Eric	September 2021
Knorr, <b>Sara McAllister</b> , Nirjhar Mukherjee, Prashant Pandey, Donald E. Porter, Jun Yuan, Yang Zhan	
The CacheLib Caching Engine: Design and Experiences at Scale	OSDI 2020
Benjamin Berg, Daniel S. Berger, <b>Sara McAllister</b> , Isaac Grosof, Sathya Gunasekar, Jimmy Lu, Michael Uhlar, Jim Carrig, Nathan Beckmann, Mor Harchol-Balter, Gregory R. Ganger	Acceptance Rate: 18%
Small Refinements to DAM Can Have Big Consequences for Data-Structure Design	SPAA 2019
Michael A. Bender, Alexander Conway, Martin Farach-Colton, William Jannen, Yizheng Jiao, Rob Johnson, Eric Knorr, <b>Sara McAllister</b> , Nirjhar Mukherjee, Prashant Pandey, Donald E. Porter, Jun Yuan, Yang Zhan	Acceptance Rate: 40%
Talks	
Scaling the bandwidth-per-TB wall with Declarative Storage Interfaces	
Salesforce (Remote) – Database Reading Group	4 Dec 2024
PDL Retreat - Presented to a large group of industry attendees	15 Oct 2024
PDL Retreat - Presented to a large group of industry attendees	6 Nov 2023
A Call for Research on Storage Emissions	15.0-+ 2024
PDL Retreat – Presented to a large group of industry attendees  Western Digital (Remote) – Hosted by Toshiki Hirano	15 Oct 2024
HotCarbon	5 Sep 2024 9 July 2024
riotCalDoll	9 July 2024
FairyWREN: A Sustainable Cache for Write-Read-Erase Interfaces	
OSDI	12 July 2024
PDL Retreat - Presented to a large group of industry attendees	7 Nov 2023
PDL Retreat - Presented to a large group of industry attendees	7 Nov 2022
Towards Understanding the Carbon Impact in End-to-end Sensing Pipelines	
HotEthics – Co-presented with Harsh Desai	29 Apr 2024
Overcoming Write Limitations to achieve Sustainable Flash Caching	
AMD (Remote) — Research and Advance Development (RAD) and Xilinx Labs	29 Mar 2024
Salesforce (Remote) – Database Reading Group	27 Mar 2024
UC Berkeley – Hosted by Natacha Crooks	25 Jan 2024
Stanford – Hosted by Keith Winstein	24 Jan 2024
UC Santa Cruz – Hosted by Andrew Quinn	11 Jan 2024
McGill (Remote) – Hosted by Oana Balmau	16 Nov 2023
Microsoft Pittsburgh – Hosted by Jeff Butler	2 Nov 2023
MIT – Hosted by Frans Kaashoek	10 Oct 2023
NDSEG 2021 Fellows Conference — Recieved best poster-presentation award	<i>31 July 2023</i>
University of Toronto – Hosted by Bianca Schroeder	20 Mar 2023
CS-JEDI: DEI education by PhD students, for PhD students	
McGill (Remote) – Hosted by Oana Balmau	31 Oct 2023
Caching on Flash: Kangaroo and Beyond	11 Mar 2022
Meta (Remote) — Core Data Tech Talk	11 Mar 2022
Kangaroo: Caching Billions of Objects on Flash	
Microsoft Research (Remote) — Hosted by Daniel Berger	22 Nov 2021
SOSP (Remote)	27 Oct 2021
Cache@Scale (Remote) — Industry Caching Meetup hosted by Meta	4 Mar 2021
Building a Stronger, More Just Academic Community Through Mandatory Anti-bias Learning	
University of Pittsburgh Diversity Forum (Remote) – <i>Co-presented w/ Bailey Flanigan and Catalina Vajiac</i>	28 July 2021

Teaching **Carnegie Mellon University** Storage Systems (15-746/18-746) TA, Fall 2023 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) 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) **Guest Lecturer** Computer Systems – Sustainable Computing (CMU 15-213/513) Fall 2024 Storage Systems - Overcoming Flash's Write Limitations to Achieve Sustainable Caching (CMU 15/18-746) Graduate Computer Architecture – Sustainable Computing (CMU 15-740) Computer Systems – Kangaroo: Caching Billions of Tiny Objects on Flash (CMU 18-213/613) Data Center Computing – Kangaroo Discussion (CMU 18-847C) CS-JEDI - Panel on Allyship (CMU 15-996) Computer Systems – Kangaroo: Caching Billions of Tiny Objects on Flash (CMU 18-213) Storage Systems - Kangaroo: Caching Billions of Tiny Objects on Flash (CMU 18-746) Mentoring. Theo Gregersen. CMU CS PhD student Fall 2024 - Present Yiwei Chen. CMU ECE masters student Fall 2024 - Present Tim Kim. CMU CS PhD student Spring 2024 - Present Sanjith Athlur. CMU CS PhD student Spring 2024 - Present Lucy Wang. CMU ECE undergraduate student Spring 2024 - Present Suhas Thalanki. CMU computational data science masters capstone Spring 2024 - Present Sriya Ravi. CMU computational data science masters capstone Spring 2024 - Present Yu Liu. CMU computational data science masters capstone Spring 2024 - Present Sophia (Qingyang) Cao. CMU CS undergraduate student Fall 2023 - Present Sarvesh Tandon. CMU ECE masters student Fall 2023 - Present Sherry (Yucong) Wang. CMU ECE undergraduate student, After degree: Salesforce Fall 2022 - Spring 2024 Akshath Karanam. CMU ECE masters student, After degree: Salesforce Priyal Suneja. Univesity of Washington CS PhD student Fall 2021 - Summer 2022 Julian Tutuncu-Macias. CMU CS undergraduate student, After degree: Goldman Sachs Fall 2019 - Spring 2021 Sheng Xu. CMU CS masters student, After degree: Amazon Web Services Karina Mejia. Ontario High School Summer 2016 Service Reviewer

Transactions on Storage (TOS)	2024
Transactions on Storage (105)	2024

## **External Reviewer**

ACM SIGME LRICS	2025
USENIX Annual Technical Conference (ATC)	2024

## **Faculty Hiring Committee**

Carnegie Mellon University, Computer Science Department	2024
Harvey Mudd College, Computer Science Department	2019

## **PhD Admissions**

**Student Organizer** 

DEI initiatives in CMU's CS Department – Informal Survey, CS-JEDI course, advisor-advisee feedback form

2020-2023

Parallel Data Lab (PDL) Meeting Coordinator

PhD Orientation Committee – CMU CS Department's Introductory Course (IC)

2020-2023

**Community Outreach** 

TechNights volunteer - CS program for middle school girls2019-2020AP CS Remote Talk at Eagan High School - On CS career opportunities2021Science Bus Volunteer and Treasurer - Teaching 4/5th graders at under-resourced schools science lessons2015 - 2018STEAM:coders Site Coordinator and Instructor - CS program for students from disadvantaged communities2016

Professional Experience \_

**Graduate Research Assistant**Carnegie Mellon University

Advisors: Nathan Beckmann and Greg Ganger

Aug. 2019 - Present

Researched reducing IO to create sustainable caching and storage systems at scale

Research Intern Microsoft Research

Mentor: Amar Phanishayee Summer 2022

Researched serving LLMs more efficiently especially under failure

Research Intern Microsoft Research

Mentor: Daniel Berger Summer 2021

Researched in-kernel disaggregated CXL memory solutions

Software Engineering Intern

Yelp

DATABASE TEAM Summer 2019

Designed, implemented, and rolled out a library to manage MySQL database permissions

Clinic (Capstone) Project

Harvey Mudd College

Sponsored by Pure Storage Aug. 2018 - May 2019

Technical lead for team of 4 designing failover mechanisms for NFS VMs running on a two-controller system

Undergraduate Research Assistant

UNC Chapel Hill

Advisor: Don Porter May 2018 - Aug. 2018

Researched theoretical and experimental analysis of write-optimized dictionaries

 Software Engineering Intern
 Facebook

 DEVELOPER EXPERIENCE TEAM
 Summer 2017

Developed a Python library to restart and repair development servers

Research Assistant

Harvey Mudd College

Advisor: Anna Ahn

May. 2016 - Jun. 2017

Researched three-legged walking and led data analysis of wearable devices