

# Fall 2024 CRSS IAB Meeting

*Heiner Litz  
Center for Research in Systems and Storage  
University of California, Santa Cruz*

UC SANTA CRUZ  
BaskinEngineering





# Welcome our Guests

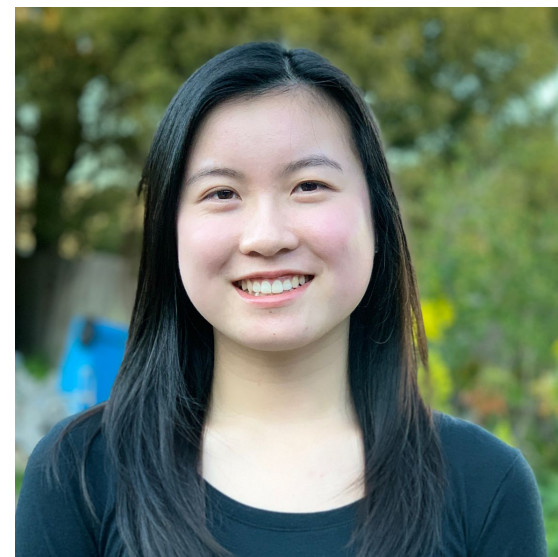


# Thank You!

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Cynthia McCarley  
**Project and Events  
Coordinator**



Megan Nguy  
**Technical Projects**



Frank Howley  
**Senior Director of  
Corporate Development**

# Thank you for your support!

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# CRSS Leadership



Heiner Litz  
**Director**  
Datacenter, tiered storage/memory, multi-tenancy, CPU architecture



Andrew Quinn  
**Associate Director**  
CXL memory pooling, heterogeneous systems, debugging, reliability



Chen Qian  
**Faculty**  
Networking, tiered memory KV-stores, SmartNICs



Darrell Long  
**Director Emeritus**  
Security, ML for Storage, Ceph, Erasure codes



Ethan Miller  
**Director Emeritus**  
Archival/cold storage, secure deletion, ZNS, non-volatile memory, OS



Peter Alvaro,  
**Faculty**  
Distributed systems, fault-tolerance, Storage & Genomics



Ioannis Demertzis  
**Faculty**  
Security, oblivious memory, encryption



Abel Souza  
**Faculty**  
Sustainability  
Data Center Systems



Ike Nassi,  
**Adjunct Faculty**  
Virtual Machines, memory pooling & disaggregation



# CRSS in a Nutshell



## Research Challenges

- Data Center Infrastructure
- Machine Learning & Systems
- Storage technologies
- Interconnection Networks
- Computation (CPU, GPU, accelerators)

## Funding

- National Science Foundation
- Department of Energy
- Industry sponsors
- About \$600K per year across all sources

## Goals & Metrics

- High Performance
- Power Efficiency
- Low Total Cost of Ownership (TCO)
- High Utilization
- Security Guarantees

## People & interactions

- 4+3 core faculty Postdocs and staff
- ≈15 graduate students
- 8+ Industry Members
- Close cooperation with sponsors
- High visibility

# CRSS Mechanics

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## ❖ Two Industrial Advisory Board (IAB) Meetings per Year

- IAB + NSF evaluates progress
- Provides feedback and new project ideas
- Networking between industry and academia
- Next Retreat in November

## ❖ Deep Dives & IAB Member Presentations

## ❖ Industry-academia Collaborations

- Hiring events @UCSC
- Student Internships
- Invited talks (both ways)

# Membership Benefits

- ❖ **Access to Talent:** Highly-skilled Ph.D. students and faculty
- ❖ **De-risk R&D:** Cutting-edge, validated research
- ❖ **Great Research ROI:** High-impact results, low fees
- ❖ **Leverage Research \$:** Low overhead, pooled resources
- ❖ **Networking:** Foster industry and academic links
- ❖ **Access to IP:** NERF access to all technologies and patents





# CRSS Products



- ❖ **Highly trained Ph.D., MS, BS students joining IAB member companies**
  - Over 20 FTEs in the last decade
  - Many successful internships
- ❖ **Publications**
  - 2024: VLDB, S&P, SoCC, CACM, HotInfra, HPCA, Queue
  - 2023: ASPLOS (2x), SIGMETRICS, MICRO Top Pick, CHEOPS
  - 2022: ASPLOS (2x), OSDI, Eurosys, MICRO (2x), ISCA, CIDR, CACM, SIGOPS,
- ❖ **Open-sourced high-impact research**





# Budget & Financial Overview



- ❖ **Cost per student-quarter**
  - \$17,052–\$18,161: salary & benefits
  - \$7,222: in-state tuition & fees
  - \$15,034: out-of-state tuition & fees
  - Non-resident tuition (NRT) incentive
- ❖ **Typical per-quarter costs**
  - 6 students @ \$23,000
  - Staff @ \$24,000
  - Meetings, travel, hardware & software @ \$13,500
  - Budget only includes CRSS membership fees (not NSF CRSS funding)
- ❖ Other sources: NSF, DOE, DARPA grants
- ❖ Students sometimes funded as TAs (CS & CE program requirement)
- ❖ University takes 10% overhead from membership fees

Total Expenditures through Spring 2024	
Salary & benefits	\$2,209,568
Tuition & fees	\$843,472
<ul style="list-style-type: none"> <li>● Supplies, equipment &amp; travel</li> <li>● IAB meetings</li> <li>● Group meetings</li> <li>● Conferences</li> <li>● Hardware</li> <li>● Software</li> </ul>	\$529,555
<b>Total received:</b>	<b>\$4,630,203</b>
<b>Available:</b>	<b>\$777,890</b>





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# CRSS Fall 2024 Industrial Advisory Board Meeting

November 13, 2024 | 8:30am-5:30pm | UCSC Extension



## Event Highlights



**Matt Bromage (ARM)**  
Near-Memory Compute for AI Inferencing  
Alumni Keynote



**Jayjeet Chakraborty**  
Accelerating Vector Search Performance  
for AI On Modern Hardware



**Pooneh Safayeniko**  
Bede: Exploiting CXL-Memory for Cluster  
Job Scheduling



**Minghao Xie**  
En4S: Enabling SLOs in Serverless  
Storage Systems

Address:  
3175 Bowers Avenue  
Santa Clara, CA 95054  
[Google map](#)

Contact:  
[cymccar@ucsc.edu](mailto:cymccar@ucsc.edu)

Registration: [Link](#)

Zoom: [Link](#)

## Sponsors





## Full Agenda

8:30-9:00 AM	Breakfast and settle-in
9:00-10:00 AM	Welcome and Introductions Financial Overview
10:00-11:00 AM	<u>Project Updates 1</u> <ul style="list-style-type: none"> <li>Accelerating Vector Search Performance On Modern Hardware (Jayjeet Chakraborty) [<a href="#">abstract</a>, <a href="#">slides</a>]</li> <li>En4S: Enabling SLOs in Serverless Storage Systems (Minghao Xie) [<a href="#">abstract</a>, <a href="#">slides</a>]</li> <li>Outback: Fast and Communication-efficient Index for Key-Value Store on Disaggregated Memory (Yi Liu) [<a href="#">abstract</a>, <a href="#">slides</a>]</li> </ul>
11:00-11:15 AM	Progress review of morning sessions (feedback)
11:15-12:00 PM	<u>Alumni Keynote</u> Near-Memory Compute for AI Inferencing (Matt Bromage - ARM) [ <a href="#">abstract</a> ]
12:00-1:00 PM	Lunch
1:00-2:00 PM	<u>Project Updates 2</u> <ul style="list-style-type: none"> <li>Obliviate: portable, efficient, and crash-consistent secure deletion enforced using the Rust compiler (Eugene Chou) [<a href="#">abstract</a>, <a href="#">slides</a>]</li> <li>Sparta: Practical Anonymity with Long-Term Resistance to Traffic Analysis (Kyle Fredrickson) [<a href="#">abstract</a>, <a href="#">slides</a>]</li> <li>RIFS: Run-time Invariant Function Specialization (Saba Jamilan) [<a href="#">abstract</a>, <a href="#">slides</a>]</li> </ul>
2:00-2:15 PM	Progress review (feedback)
2:15-2:30 PM	Break

## Full Agenda (continued)

2:30-3:30 PM	<u>Project Updates 3</u> <ul style="list-style-type: none"> <li>Towards QEMU-Based CXL-SSD Emulation with Hint-driven In-device Data Placement (Lokesh Jaliminche) [<a href="#">abstract</a>, <a href="#">slides</a>]</li> <li>Semantic Data Tiering for CXL Memory Systems (Allen Aboytes) [<a href="#">abstract</a>, <a href="#">slides</a>]</li> <li>Bede: Exploiting CXL-Memory for Cluster Job Scheduling (Pooneh Safayenikoo) [<a href="#">abstract</a>, <a href="#">slides</a>]</li> </ul>
3:30-3:45 PM	Progress review (feedback)
3:45-4:00 PM	Break
4:00-5:30 PM	New Business and Feedback to Center Director (IAB members only)  Poster Session and Mixer

IAB Feedback Form:



Zoom: [Link](#)

Meeting ID: 920 8478 7974

Passcode: 912368

Address:

3175 Bowers Avenue  
Santa Clara, CA 95054

[Google map](#)

Contact:

[cynmccar@ucsc.edu](mailto:cynmccar@ucsc.edu)

Registration:

[Link](#)