Tyler Estro

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Objective

I'm a Ph.D. candidate in Computer Science at Stony Brook University (SBU), advised by Professor Erez Zadok. I work as a Research Assistant in the File Systems and Storage Lab (FSL) and am also a member of SBU's Institute for AI-Driven Discovery and Innovation. My current research focuses on tiered-memory systems that leverage Compute Express Link (CXL) technology. I've published across a diverse range of topics, including the efficient exploration and optimization of multi-tier caching systems, performance modeling, visualization, artificial intelligence, and even applications of high-performance computing and AI in life sciences. Through this work, I've built a strong foundation in research, engineering, and team leadership, supporting a broad spectrum of technical endeavors beyond any single domain.

Education

- **Stony Brook University** *2018 – Current*
  Ph.D. in Computer Science Stony Brook, NY
  - Analysis of Algorithms, Computer Architecture, Compiler Design, Discrete Mathematics, Fundamentals of Data Science, Operating Systems, Logic in Computer Science, Systems Security, Theory of Computation.
- **Farmingdale State College**
  B.S. in Software Technology Farmingdale, NY
- **Suffolk County Community College**
  A.S. in Business Administration Selden, NY

Skills

- **Programming & Scripting Languages:** C, C++, Python, Bash
- **Systems:** Linux kernel development, device drivers, QEMU/KVM, Chameleon Cloud
- **Memory & Storage:** File systems, CXL, RDMA, persistent memory, NVMe, DAX, Open CAS
- **AI & Machine Learning:** PyTorch, TensorFlow, CUDA, multi-objective optimization, reinforcement learning, hyper-parameter tuning, neural networks
- **Data Analysis & Visualization:** Matplotlib, NumPy, Pandas/Polars, Jupyter, parallel coordinates, dimensionality reduction, workload characterization
- **Performance & Profiling Tools:** FIO, perf, eBPF/BPF-trace, strace, GDB, valgrind
- **Research:** Experimental design, statistical analysis, scientific writing, LaTeX, grant proposals, peer review

Experience

- **File Systems and Storage Lab (FSL), Stony Brook University** *2018 – Current*
  Research Assistant Stony Brook, NY
- **Institute for Advanced Computational Science, Stony Brook University** *2017 – 2018*
  High Performance Computing Assistant Stony Brook, NY
  - Provided technical support to users in areas such as parallelizing serial applications, modularizing environment configurations, software package installation and maintenance, debugging code, and education on HPC topics
  - Hosted XSEDE HPC Workshop: Big Data
- **Lake Grove Diner** *2012 – 2017*
  Waiter Lake Grove, NY
- **Various Service Industry Jobs** *2006 – 2012*

Teaching Experience

- **Research Mentor, File Systems and Storage Lab** *2018 – Current*
  Stony Brook University, NY
  - Mentored 1–5 graduate or undergraduate students each semester on independent research or capstone projects
  - Supervised visiting students from external institutions, including Harvey Mudd and Pomona College
- **Graduate Teaching Assistant** *2017 – 2025*
  Stony Brook University, NY
  - CSE 219: Computer Science III, CSE 506: Operating Systems, CSE 564: Visualization, CSE 590: Special Topics – Storage Systems

PUBLICATIONS

C=CONFERENCE, J=JOURNAL

[C.1] Xinyu Zhang, Mario Antunes, **Tyler Estro**, Erez Zadok, Klaus Mueller. (2025). **Smart Starts: Accelerating Convergence Through Uncommon Region Exploration**. In *Proceedings of the Genetic and Evolutionary Computation Conference Companion (GECCO '25)*. ACM. To appear Jul 2025, Málaga, Spain. *(Short paper & poster)*

[J.1] Xinyu Zhang, **Tyler Estro**, Geoff Kuenning, Erez Zadok, Klaus Mueller. (2025). **Into the Void: Mapping the Unseen Gaps in High-Dimensional Data**. *IEEE Transactions on Visualization and Computer Graphics*, Early Access. DOI: 10.1109/TVCG.2025.3572850

[J.2] Mário Antunes, **Tyler Estro**, Pranav Bhandari, Anshul Gandhi, Geoff Kuenning, Yifei Liu, Carl Waldspurger, Avani Wildani, Erez Zadok. (2025). **Kneeliverse: A Universal Knee-Detection Library for Performance Curves**. *SoftwareX*, Vol. 30, Article 102161 (8 pp.). DOI: 10.1016/j.softx.2025.102161

[J.3] **Tyler Estro**, Mário Antunes, Pranav Bhandari, Anshul Gandhi, Geoff Kuenning, Yifei Liu, Carl Waldspurger, Avani Wildani, Erez Zadok. (2024). **Accelerating Multi-Tier Storage Cache Simulations Using Knee Detection**. *Performance Evaluation*, Vol. 164, Article 102410 (12 pp.). DOI: 10.1016/j.peva.2024.102410

[C.2] Peter Desnoyers, Ian Adams, **Tyler Estro**, Anshul Gandhi, Geoff Kuenning, Mike Mesnier, Carl Waldspurger, Avani Wildani, Erez Zadok. (2023). **Persistent Memory Research in the Post-Optane Era**. In *Proc. 1st Workshop on Disruptive Memory Systems (DIMES '23)*, pp. 23–30. ACM. 23 Oct 2023, Koblenz, Germany. DOI: 10.1145/3609308.3625268

[C.3] **Tyler Estro**, Mário Antunes, Pranav Bhandari, Anshul Gandhi, Geoff Kuenning, Yifei Liu, Carl Waldspurger, Avani Wildani, Erez Zadok. (2023). **Guiding Simulations of Multi-Tier Storage Caches Using Knee Detection**. In *31st IEEE Intl. Symposium on Modeling, Analysis & Simulation of Computer and Telecommunication Systems (MASCOTS '23)*, pp. 1–8. IEEE. 16–18 Oct 2023, Stony Brook, NY, USA. DOI: 10.1109/MASCOTS59514.2023.10387545

[C.4] Anjul Tyagi, **Tyler Estro**, Geoff Kuenning, Erez Zadok, Klaus Mueller. (2022). **PC-Expo: A Metrics-Based Interactive Axes Reordering Method for Parallel Coordinate Displays**. In *IEEE Conference on Visualization and Visual Analytics (VIS '22)*, pp. 712–722. IEEE. 16–21 Oct 2022, Oklahoma City, OK, USA. DOI: 10.1109/TVCG.2022.3209392

[J.4] Alex Borowicz, Heather Lynch, **Tyler Estro**, Catherine Foley, Bento Gonçalves, Katelyn Herman, Stephanie Adamczak, Ian Stirling, Lesley Thorne. (2021). **Social Sensors for Wildlife: Ecological Opportunities in the Era of Camera Ubiquity**. *Frontiers in Marine Science*, Vol. 8, Article 645288 (15 pp.). DOI: 10.3389/fmars.2021.645288

[J.5] Muhammad Wajahat, Aditya Yele, **Tyler Estro**, Anshul Gandhi, Erez Zadok. (2020). **Analyzing the Distribution Fit for Storage Workload and Internet Traffic Traces**. *Performance Evaluation*, Vol. 142, Article 102121 (14 pp.). DOI: 10.1016/j.peva.2020.102121

[C.5] **Tyler Estro**, Pranav Bhandari, Avani Wildani, Erez Zadok. (2020). **Desperately Seeking ... Optimal Multi-Tier Cache Configurations**. In *12th USENIX Workshop on Hot Topics in Storage and File Systems (HotStorage '20)*, Article 6 (6 pp.). USENIX Association. 13–14 Jul 2020, Online. DOI: 10.5555/3488733.3488739

[C.6] Muhammad Wajahat, Aditya Yele, **Tyler Estro**, Anshul Gandhi, Erez Zadok. (2019). **Distribution Fitting and Performance Modeling for Storage Traces**. In *27th IEEE Intl. Symp. on Modeling, Analysis & Simulation of Computer and Telecommunication Systems (MASCOTS '19)*, pp. 138–151. IEEE. 22–25 Oct 2019, Rennes, France. DOI: 10.1109/MASCOTS.2019.00024
Won Best Paper Award!

[C.7] Anjul Tyagi, Zhen Cao, **Tyler Estro**, Klaus Mueller, Erez Zadok. (2019). **ICE: Interactive Configuration Explorer for High-Dimensional Categorical Parameter Spaces**. In *IEEE Conference on Visual Analytics Science and Technology (VAST '19)*, pp. 23–34. IEEE. 20–25 Oct 2019, Vancouver, BC, Canada. DOI: 10.1109/VAST47406.2019.8986923

POSTERS

- **Computer vision for the detection and segmentation of penguin colonies in satellite imagery** *October 2019*
  Microsoft's AI for Good Summit
  ◦ **Tyler Estro**, Hieu Le, Bento Goncalves, Brad Spitzbart, Dimitris Samaras, Heather J. Lynch
- **Graphs Are Not Enough: Using Interactive Visual Analytics in Storage Research** *July 2019*
  11th USENIX Workshop on Hot Topics in Storage (HotStorage '19)
  ◦ Zhen Cao, **Tyler Estro**, Geoff Kuenning, Klaus Mueller, Anjul Tyagi, and Erez Zadok
- **Towards Better Understanding of Black-box Auto-Tuning: A Comparative Analysis for Storage Systems** *July 2018*
  2018 USENIX Annual Technical Conference (ATC '18)
  ◦ Zhen Cao, **Tyler Estro**, Vasily Tarasov, Sachin Tiwari, Erez Zadok

PROJECTS

- **FOUNT: Scaffolded Hands-On Learning for a Data-Centric Future** *Jan 2023 – Current*
  Tools: Chameleon Cloud, Jupyter Notebook, C, C++, Python, Bash [🌐]
  - Developed numerous Jupyter-based "courselets"—self-contained notebooks for teaching data-systems concepts—designed for deployment on Chameleon Cloud
  - Packaged and uploaded courselets as artifacts to Trovi, providing educational materials that students can easily run, modify, and extend
  - Deployed courselets in a graduate-level course and iteratively improved them based on student feedback, producing guidelines for effective open educational resource design
  - Presented a demonstration of courselets during the educational symposium at the Chameleon User Meeting 2023
- **Open CAS tiered-storage workload tracing tool** *Jun 2022 – Current*
  Tools: Open CAS, FIO, C, Python, Bash [*(private)*]
  - Enhanced Open Cache Acceleration Software (Open CAS) and Linux kernel device drivers to capture low-level traces of multi-tiered caching operations
  - Instrumented kernel event tracing to capture request response times, service times, and inter-arrival times for use in queuing models
- **Multi-tier cache simulator** *July 2019 – Current*
  Tools: PyMimircache, C, Python, NumPy, Pandas [*(private)*]
  - Extended PyMimircache to simulate multi-tier caches
  - Implemented evaluation engine that combines per-device performance characteristics and price data to generate performance and dollar-cost metrics for every configuration
  - Conducted large-scale simulations using hundreds of real-world workload traces, exploring millions of cache configurations across varied devices and caching parameters to collect hit rate, throughput, and cost metrics

HONORS AND AWARDS

- **Best Paper Award — "*Distribution Fitting and Performance Modeling for Storage Traces*"** *Oct 2019*
  27th IEEE Intl. Symp. on Modeling, Analysis & Simulation of Computer and Telecommunication Systems (MASCOTS '19)
- **Computer Science, Engineering, and Mathematics Scholarship (CSEMS)** *2012*
  National Science Foundation (NSF)
  - Advised by Professor Ben Chen of Suffolk County Community College
- **Battle of the Brains Programming Competition** *2012*
  Suffolk County Community College
  - Awarded first place for designing an educational GUI application to assist chemistry students

ADDITIONAL INFORMATION

- **Peer Reviews:** ACM Transactions on Storage (TOS), 2024
- **Residency & Citizenship:** Born United States citizen and lifelong New York State resident
- **Languages:** Native English and beginner Japanese (actively learning)