Vaastav Anand

Campus E1 5, Saarbruecken, Germany 66111
vaastav@mpi-sws.org, https://vaastavanand.com/

Research Interests

I like building, testing, breaking, and fixing systems.
My primary research interests lie at the heart of cloud computing, focused on building more performant cloud systems and diagnosing performance issues in such systems.
I am also interested in the performance reliability of Post-Moore heterogeneous hardware systems in the context of cloud systems.

Education

PhD, Computer Science 2020-current
Max Planck Institute for Software-Systems (MPI-SWS), Saarbruecken, Germany

MSc, Computer Science 2018-2020
University of British Colombia, Vancouver, Canada
Thesis: Dara the explorer : coverage based exploration for model checking of distributed systems in Go

BSc, Computer Science 2013-2018
University of British Colombia, Vancouver, Canada

Selected Research Projects

Iridescent 2022-current
Iridescent is a library that provides developers a systematic way for developers to support generalization while also taking advantage of specialization optimization opportunities arising from the workload and the deployment environment.

Blueprint (fka Millenial) 2020-current
A framework for developing flexible and modular microservice applications.
Provides a programming abstraction for writing microservice applications that makes it easy to later change aspects related to the system's scaffolding and topology.

Publications

Papers

Vaastav Anand, Deepak Garg, Antoine Kaufmann, Jonathan Mace. Blueprint: A Toolchain for Highly Reconfigurable Microservice Applications. In Symposium on Operating Systems Principles, **SOSP 2023**.

Lei Zhang, Zhiqiang Xie, **Vaastav Anand**, Ymir Vigfusson, Jonathan Mace. The Benefit of Hindsight: Tracing Edge Cases in Distributed Systems. In Networked Systems Design and Implementation, **NSDI 2023**.

Vaastav Anand, Zhiqiang Xie, Matheus Stolet, Roberta De Viti, Thomas Davidson, Reyhaneh Karimipour, Safya Alzayat, Jonathan Mace. The Odd One Out: Energy is not like Other Metrics. In **HotCarbon 2022**.

Vaastav Anand*, Puneet Mehrotra*, Daniel Margo*, Margo Seltzer. Smooth Kronecker: Solving the Combing Problem in Kronecker Graphs. In Joint Workshop on Graph Data Management Experiences and Systems and Network Data Analytics, **GRADES-NDA 2020**.

Pedro Las-Casas, Giorgi Papakerashvili, **Vaastav Anand**, Jonathan Mace. Sifter: Scalable Sampling for Distributed Traces, without Feature Engineering. In Symposium on Cloud Computing, **SoCC 2019**.

Pre-Prints

Jakob Görgen, **Vaastav Anand**, Hejing Li, Jialin Li, and Antoine Kaufmann. Columbo: Low Level End-to-End System Traces through Modular Full-System Simulation. In **arXiv 2024**, `https://arxiv.org/pdf/2408.05251`.

Puneet Mehrotra*, **Vaastav Anand***, Daniel Margo, Milad Rezaei Hajidehi, and Margo Seltzer. SoK: The Faults in our Graph Benchmarks. In **arXiv 2024**, `https://arxiv.org/pdf/2404.00766`.

Vaastav Anand, Matheus Stolet, Thomas Davidson, Ivan Beschastnikh, Tamara Munzner, and Jonathan Mace. Aggregate-driven trace visualizations for performance debugging. In **arXiv 2020**, `https://arxiv.org/pdf/2010.13681`.

Posters

Vaastav Anand. Online specialization of systems with Iridescent. At Student Research Competition at Symposium on Operating Systems Principles, **SRC @ SOSP 2024**.

Vaastav Anand, Antoine Kaufmann, Deepak Garg, Jonathan Mace. Millenial: Modular Microservice Macrobenchmarks. At Operating Systems Design and Implementation, **OSDI 2022**.

Vaastav Anand. Millenial: Modular Microservice Macrobenchmarks. At Student Research Competition at Symposium on Operating Systems Principles, **SRC @ SOSP 2021**.

Vaastav Anand. Millenial: Modular Microservice Macrobenchmarks. At Eurosys Doctoral Workshop, **EuroDW 2021**.

Pedro Las-Casas, Giorgi Papakerashvili, **Vaastav Anand**, Jonathan Mace. Sifter: Scalable Sampling for Distributed Traces, without Feature Engineering. At Symposium on Cloud Computing, **SoCC 2019**.

Vaastav Anand. Dara: Hybrid Model Checking of Distributed Systems. At Student Research Competition at The ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering, **SRC @ ESEC/FSE 2018**.

Employment

Research Intern, Microsoft — 2024
Azure Research - Systems

- Worked on "Automated Service Design with LLMs" project.
- Mentors: Rodrigo Fonseca, Alok Gautam Kumbhare
- Collaborators: Pedro Las-Casas, Celine Irvene, Jonathan Mace, Gagan Somashekar, Chetan Bansal

Research Intern, MPI-SWS — 2019

- Instrumented DeathStarBench applications with XTrace tracing for large-scale experiments for Sifter.

Undergraduate Research Assistant — 2018

University of British Columbia, Under Ivan Beschastnikh
- Designed and developed Dara, a tool for model checking distributed systems.

Software Engineering Intern, NVIDIA 2017
MODS (Modular Diagnostics) Team
- Implemented memory repair sequences for faulty High Bandwith Memory(HBM).
- Designed, developed and implemented a CUDA based full memory stress test.

Software Engineering Intern, NVIDIA 2016
MODS (Modular Diagnostics) Team
- Implemented a synchronization option for CUDA based linpack tests to synchronize CUDA kernel launches within 30us across multiple GPUs.

Software Developer Intern, Thinkbox Software 2015-2016
Sequoia Team
- Designed, developed and implemented the 3D PDF export option in Sequoia.

Teaching

Teaching Assistant, Saarland University 2021

- 1 semester TA for Distributed Systems (Core Course) 2021

Graduate Teaching Assistant 2018-2020
University of British Coluimbia, Department of Computer Science
- 1 semester TA for Computer Hardware and Operating Systems (CPSC 313) 2020
- 1 semester TA for Graduate Operating Systems (CPSC 508) 2019
- 1 semester TA for Distributed Systems (CPSC 416) 2018

Academic Assistant 2018
Vancouver Summer Program
- Teaching Assistant for the Algorithms and the World Wide Web course.

Undergraduate Teaching Assistant 2014-2018
University of British Columbia, Department of Computer Science
- 1 semester TA for Introduction to Software Engineering (CPSC 210) 2018
- 1 semester TA for Advanced Operating Systems (CPSC 415) 2017
- 1 semester TA for Intermediate Algorithm Design and Analysis (CPSC 320) 2017
- 1 semester TA for Computer Hardware and Operating Systems (CPSC 313) 2016
- 1 semester TA for Introduction to Computer Systems (CPSC 213) 2015
- 3 semesters TA for Models of Computation (CPSC 121) 2014-2015

Awards

1st Place, Graduate Catgeory, SOSP'24 SRC 2024
SoCC Student Scholarship 2019
2nd Place, Undergraduate Category, FSE'18 SRC 2018
SIGSOFT CAPS Award 2018
UBC International Tuition Award 2018-2019
Work Learn International Undergraduate Research Award 2018
UBC Faculty of Science, International Student Award 2015, 2018
ACM ICPC PacNW Regional Contest Division 2 Champion 2017
UBC Trek Excellence Scholarship 2016-17, 2017-2018
UBC Dean's Honor List 2014, 2015, 2017
UBC Computer Science Student Service Award 2015
GIIS Global Citizen Scholarship 2011-2013

Service

Academic Service

- Program Committee Member
  - CS-Can Student Symposium 2019
- Organizer
  - Tutorial on using Blueprint to accelerate Microservice Research @ SOSP'24
  - Panel on Reproducibility and Replication @ HotOS'23
- Publicity Chair
  - The Journal of Systems Research 2022-2023.
- Systems Trivia Co-Organizer
  - HotOS 2023
  - SOSP 2021
  - HotOS 2021
- Organization Committee Member
  - The Cornell, Maryland, Max Planck Pre-doctoral Research School (CMMRS) 2022

Invited Talks

Blueprint: A Toolchain for Highly-Reconfigurable Microservices — Jun 2024
Event: Azure Monitor Day of Learning @ Microsoft Redmond
Host: Kalyana Sundaram

Blueprint: A Toolchain for Highly-Reconfigurable Microservices — Aug 2023
Event: Trustworthy Systems Seminar @ UNSW Sydney
Host: Peter Chubb

Blueprint: A Toolchain for Highly-Reconfigurable Microservices — Aug 2023
Event: Basser Seminar Series @ University of Sydney
Host: Zhanna Sarsenbayeva

Millenial: Modular Microservice Macrobenchmarks — Jun 2021
Event: Tracing Jamboree @ Emory University (virtual)
Organizers: Avani Wildani, Ymir Vigfusson

Skills

Programming Languages: C++, Go, Python, C, Bash, JavaScript, Java, CUDA
Tools: IntelliJ, GDB, Eclipse, Visual Studio, Git, Perforce, Vim, LaTeX

Selected Non-Research Projects

Distributed Clocks — 2018-2020
Inter-operable vector clock logging library

- Distributed clocks implements vector clocks in Go, Java, C++ and C
- `https://github.com/DistributedClocks`

Datasets

- Vaastav Anand. Fantasy Premier League Gameweek-By-Gameweek Dataset. `https://github.com/vaastav/Fantasy-Premier-League`
- Vaastav Anand and Jonathan Mace. X-Trace trace dataset for DeathStarBench. `https://gitlab.mpi-sws.org/cld/trace-datasets/deathstarbench_traces`

Interests *Computing:* Distributed Systems, Operating Systems, Software Engineering
Extra Curricular: Soccer, Linguistics, Cricket.