Rishabh Iyer

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Research Interests

I am a computer systems researcher (broadly construed). My current research is centered around developing techniques and tools that enable engineers to build systems with *well-understood performance properties*. My research draws on insights and techniques from a broad range of domains including operating systems, networking, computer architecture, formal methods, and compilers.

Education

Ecole Polytechnique Federale de Lausanne (EPFL) ..... 2017 - 2023
Doctor of Philosophy (PhD), Computer Science
Thesis: Latency Interfaces for Systems Code
Advisors: Prof. George Candea & Prof. Katerina Argyraki

Indian Institute of Technology Bombay ..... 2013 - 2017
Bachelor of Technology (BTech) with Honours, Electrical Engineering
Thesis: Performance Modelling and Dynamic Scheduling for Heteroeneous ISA Processors
Advisor: Prof. Virendra Singh

Professional Experience

Postdoctoral Scholar at UC Berkeley ..... Mar 2024 - Present
Supervisor: Prof. Sylvia Ratnasamy and Prof. Scott Shenker
Working on a wide range of topics in networked systems.

Visiting Researcher at UC Berkeley ..... Sep 2022 - March 2023
Supervisor: Prof. Sylvia Ratnasamy
Worked on performance interfaces for hardware accelerators.

Summer Intern at EPFL ..... May - July 2016
Supervisor: Prof. Babak Falsafi
Ported the QFlex Trace Simulator from QEMU 2.3 to QEMU 2.6

Honors & Awards

Dimitris N. Chorafas Dissertation Award 2024
Awarded yearly to two doctoral theses across all schools at EPFL

eBPF Foundation Research Award 2024

Eurosys Roger Needham Dissertation Award 2024
Awarded yearly for best doctoral thesis in computer systems at a European university

ACM SIGOPS Dennis M. Ritchie Doctoral Dissertation Award 2023
Awarded yearly for best doctoral thesis in computer systems worldwide

Thesis nominated by EPFL for ACM Doctoral Dissertation Award 2023

Best Paper Award ..... VDAT 2019

EPFL Doctoral Fellowship 2017

Government of India KVPY Fellowship 2013

Publications

1. **The Case for Validating Inputs in Software-Defined WANs**
   Alexander Krentsel, Rishabh Iyer, Isaac Keslassy, Sylvia Ratnasamy, Anees Shaikh, Rob Shakir.
   Hot Topics in Networking (HotNets), 2024. Acceptance rate: 27.8%

2. **Revisiting Cache Freshness for Emerging Real-Time Applications**
   Ziming Mao, Rishabh Iyer, Scott Shenker, Ion Stoica.
   Hot Topics in Networking (HotNets), 2024. Acceptance rate: 27.8%

3. **If Layering Is Useful, Why Not Sublayering?**
   Rathin Singha, Rishabh Iyer, Charles Liu, Caleb Terrill, Todd Millstein, Scott Shenker, George Varghese.
   Hot Topics in Networking (HotNets), 2024. Acceptance rate: 27.8%

4. **Fast, Flexible, and Practical Kernel Extensions**
   Kumar Kartikeya Dwivedi, Rishabh Iyer, Sanidhya Kashyap.
   Symposium on Operating Systems Principles (SOSP), 2024. Acceptance rate: 17.3%
   Also accepted to the Linux Plumbers Conference (LPC) 2024.
   eBPF Foundation Research Award 2024.
   Upstreamed into the Linux kernel mainline

5. **Automatically Reasoning About How Systems Code Uses the CPU Cache**
   Rishabh Iyer, Katerina Argyraki, George Candea.
   Symposium on Operating Systems Design and Implementation (OSDI), 2024. Acceptance rate: 15.6%
   Also accepted to the Linux Plumbers Conference (LPC) 2024.

6. **Performance Interfaces for Hardware Accelerators**
   Jiacheng Ma, Rishabh Iyer, Sahand Kashani, Mahyar Emami, Thomas Bourgeat, George Candea.
   Symposium on Operating Systems Design and Implementation (OSDI), 2024. Acceptance rate: 15.6%

7. **Achieving Microsecond-Scale Tail Latency Efficiently with Approximate Optimal Scheduling**
   Rishabh Iyer, Musa Unal, Marios Kogias, George Candea.
   Symposium on Operating Systems Principles (SOSP), 2023. Acceptance rate: 18.7%

8. **The Case for Performance Interfaces for Hardware Accelerators**
   Rishabh Iyer, Jiacheng Ma, Katerina Argyraki, George Candea, Sylvia Ratnasamy.
   Hot Topics in Operating Systems (HotOS), 2023. Acceptance rate: 26.4%

9. **Performance Interfaces for Network Functions**
   Rishabh Iyer, Katerina Argyraki, George Candea.
   Symposium on Networked Systems Design and Implementation (NSDI), 2022. Acceptance rate: 19.7%

10. **Bypassing the Load Balancer Without Regrets.**
    Marios Kogias, Rishabh Iyer, Edouard Bugnion.
    Symposium on Cloud Computing (SoCC), 2020. Acceptance rate: 24.4%
    Deployed as part of Alibaba's Next-Generation Load Balancer.

11. **Classification-Based Scheduling in Heterogeneous-ISA Architectures**
    Nirmal Boran, Dinesh Yadav, Rishabh Iyer.
    Symposium on VLSI Design and Test (VDAT), 2020. Acceptance rate: 28.7%

12. **Verifying Software Network Functions with No Verification Expertise**
    Arseniy Zaostrovnykh, Solal Pirelli, Rishabh Iyer, Luis Pedrosa, Matteo Rizzo, Katerina Argyraki, George Candea.
    Symposium on Operating Systems Principles (SOSP), 2019. Acceptance rate: 13.7%

13. **Performance Contracts for Software Network Functions**
    Rishabh Iyer, Luis Pedrosa, Arseniy Zaostrovnykh, Solal Pirelli, Katerina Argyraki, George Candea.
    Symposium on Networked Systems Design and Implementation (NSDI), 2019. Acceptance rate: 14.7%

14. **Performance Modelling and Dynamic Scheduling on Heterogeneous-ISA Architectures**
    Nirmal Boran, Dinesh Yadav, Rishabh Iyer
    Symposium on VLSI Design and Test (VDAT), 2019. Acceptance rate: 27.3%
    Awarded Best Paper

15. **Automated Synthesis of Adversarial Workloads for Network Functions**
Luis Pedrosa, Rishabh Iyer, Arseniy Zaostrovnykh, Jonas Fietz, Katerina Argyraki.
ACM SIGCOMM Conference (SIGCOMM), 2018. Acceptance rate: 18%

Research Mentorship

1. Jiacheng Ma (PhD student at EPFL) ..... Fall 2022 - Present
Performance interfaces for hardware accelerators
Second author on publication at HotOS'23, lead author on publication at OSDI'24.
2. Kumar Kartikeya Dwivedi (PhD student at EPFL) ..... Summer 2023 - Present
Fast, flexible, and practical kernel extensions
Lead author on publication at SOSP'24
3. Alexander Krenstsel (PhD student at UC Berkeley) ..... Spring 2024 - Present
Input Validation for Software-Defined Wide Area Networks
Lead author on publication at HotNets 2024.
4. Ziming Mao (PhD student at UC Berkeley) ..... Spring 2024 - Present
Cache freshness for emerging real-time applications
Lead author on publication at HotNets 2024.
5. Rathin Singla (PhD student at UCLA) ..... Fall 2022 - Present
A verified, extensible transport stack
Lead author on publication at HotNets 2024.
6. Narek Galstyan (PhD student at UC Berkeley) ..... Fall 2022 - Spring 2023
Application-integrated record and replay for distributed systems
7. Musa Unal (summer intern at EPFL → PhD student at EPFL) ..... Summer 2022 - Fall 2023
Cooperative scheduling for microsecond-scale datacenter applications
Second author on publication at SOSP'23.
8. Anastasia Safargalieva (summer intern at EPFL → PhD student at TU Denmark) ..... Summer 2022
Performance interfaces for microservice-based applications
9. Ayoub Chouak (summer intern at EPFL → security engineer at Taurus SA) ..... Summer 2021
Using performance interfaces to identify constant-time violations in cryptographic code
Significant contributor to publication at NSDI'22.
10. Yugesh Kothari (summer intern at EPFL → PhD student at EPFL) ..... Summer 2021
Performance interfaces for eBPF extensions in the Linux kernel
Significant contributor to the PIX open source tool.
11. Beyazit Yancinkaya (summer intern at EPFL → PhD student at UC Berkeley) ..... Summer 2019
Accurately estimating network function throughput

Teaching Assistantships

- Principles of Computer Systems (EPFL) ..... Fall 2019, 2020, 2021
- CS 305: Software Engineering (EPFL) ..... Fall 2018
- CS 306: Software Development Project (EPFL) ..... Spring 2020
- MA 207: Analysis 4 - Vector Calculus (EPFL) ..... Spring 2018, 2019
- PH 107: Quantum Physics (IITB) ..... Spring 2014

Service

- **Member of Program Committee** for NSDI 2025, Eurosys 2025, eBPF Workshop (SIGCOMM 2024), SOSP 2024 (Posters), and SOSP Doctoral Workshop 2024.
- **Member of EPFL Doctoral Admissions Committee** in 2022 and 2023.

Talks

- **Performance Clarity for Systems Software and Hardware**
  Carnegie Mellon University ..... Oct 2024
  Systems Research at Google ..... Sep 2024
  Dagstuhl on Programmable Host Networking ..... July 2024
  UT Austin ..... May 2024
- **Automatically Reasoning About How Systems Code Uses the CPU Cache**
  Linux Plumbers Conference (LPC) ..... Sep 2024
  Symposium on Operating Systems Design and Implementation (OSDI) ..... July 2024
- **Achieving Microsecond-Scale Tail Latency Efficiently With Approximate Optimal Scheduling**
  Symposium on Operating Systems Principles (SOSP) ..... Nov 2023
- **The Case for Performance Interfaces for Hardware Accelerators**
  Workshop on Hot Topics in Operating Systems (HotOS) ..... June 2023
- **Performance Interfaces for Network Functions**
  Systems Research at Google ..... Oct 2022
  UC Berkeley ..... Sep 2022
  Harvard University ..... June 2022
  Symposium on Networked Systems Design and Implementation (NSDI) ..... April 2022
- **Performance Contracts for Network Functions**
  University of Michigan ..... Nov 2019
  Symposium on Networked Systems Design and Implementation (NSDI) ..... Feb 2019
  ETH Zurich ..... Feb 2019
  Imperial College London ..... Feb 2019
  Cambridge University ..... Feb 2019

References

Prof. George Candea
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Ecole Polytechnique Federale de Lausanne (EPFL)
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Prof. Katerina Argyraki
Associate Professor of Computer Science
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Prof. Sylvia Ratnasamy
Associate Professor of Computer Science
University of California Berkeley
Email: sylvia@eecs.berkeley.edu

Prof. George Varghese
Distinguished Professor of Computer Science
University of California Los Angeles
Email: varghese@cs.ucla.edu

Dr. David Culler
Distinguished Software Engineer
Systems Research at Google
Email: dculler@google.com