

Rajath Shashidhara

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Education

University of Washington

Ph.D. Computer Science

Advisor: Dr. Simon Peter

Areas: Systems & Networking

Seattle, WA

2021–Present

The University of Texas at Austin

M.S. Computer Science

GPA: 4.0/4.0

Coursework: Operating Systems, Datacenters, Virtualization, Distributed Systems

Austin, TX

2019–2021

Birla Institute of Technology and Science

M.Sc. Physics + B.E. Computer Science

GPA: 9.01/10 Distinction Class

Awarded **Best Student of Batch 2017**

Advisors: Dr. Tapomoy Guha Sarkar & Prof. Sundar Balasubramaniam

Pilani, India

2012–2017

Research

Google, Systems Research Group

Student Researcher

Collaborators: *Kim Keeton, Stanko Novakovic*

Seattle, WA

2022–Present

Understanding the impact of tiered memory on application performance at datacenter scale. (Ongoing)

- o Forked the production kernel to emulate swap backends with arbitrary latency and bandwidth characteristics.
- o Designed a large-scale experiment to study the effects of swapping on applications running in the fleet.
- o Developing a methodology to synthesize representative benchmarks for memory tiering.

University of Washington / The University of Texas at Austin

Graduate Research Assistant

Collaborators: *Simon Peter, Antoine Kaufmann, Marco Canini, Arvind Krishnamurthy*

Seattle, WA / Austin, TX

2019–Present

TCP offload architecture for 400G+ networks. (Ongoing)

- o Design and development of TCP offload for 400G and beyond network speeds.
- o Evaluation of different hardware architectures for high performance and energy efficiency.

Energy-efficient ML pre-processing acceleration. (Ongoing)

- o In-network data ingestion acceleration for large-scale ML training with emphasis on energy efficiency.

FlexTOE: Flexible TCP offload with Fine-Grained Parallelism. (NSDI '22)

- o Full stateful offload of TCP data-path to SmartNIC – frees CPU cores from TCP overhead.
- o Fine-grained parallelization of the TCP data-path to achieve high performance on wimpy SmartNIC cores.
- o Highly extensible offload with support for eBPF-based extensions.
- o Memcached scales up to 38% better versus TAS kernel-bypass TCP stack saving 50% per-request CPU cycles.

Samsung Research*Senior Software Engineer (Research)**Advisors: Anshuman Nigam, Dojun Byun***Bangalore, India & Suwon, South Korea***2017–2019***5G Radio Access Network data-plane R&D.**

- o Involved in the development of world's first pre-5G mobile user equipment.
- o Data-plane technical support for the 5G demo at *Winter Olympics (South Korea, 2018)*.
- o *Parallelization, memory management and flow control* research: improved throughput, ultra-low latency reliable transport, and reduced memory footprint on 5G Distributed Units.

Reinforcement Learning based radio-resource schedulers. (GLOBECOM '20)

- o Modeled scheduling as a Partially Observable Markov Decision Process to solve multi-objective optimization in stochastic input-driven environments.

Birla Institute of Technology and Science*Research Student***Pilani, India***2015–2016**Collaborators: Tapomoy Guha Sarkar, Jayendra N. Bandyopadhyay***Quantum Chaos in Aubry-André-Harper electron systems.** (PhysRevA '16)

- o Studied phase transitions in Hofstadter's butterfly under time-varying magnetic field and the relationship between topological invariants and Hall conductivity.
- o Simulated and computationally evaluated solutions to Schrodinger's equation for special quantum systems using perturbation methods and computational physics algorithms.

National Central University*Undergraduate Research Assistant***Zhongli, Taiwan***Summer 2015**Advisor: Ko Chung-Ming***Gravitational lensing in elliptical galaxies.**

- o Analytically derived the gravitational lensing equation for elliptical galaxies.
- o Developed a *distributed recursive sub-gridding* algorithm to numerically simulate the lensing.

Industry Experience

Confluent*Software Engineering Intern***Mountain View, CA***Summer 2020*

Kubernetes control plane for deployment life-cycle management of Kafka clusters.

Designed *safe and seamless live migration* of Kafka deployments with no service disruption.**Symantec***Software Engineering Intern***Bangalore, India***Spring 2017*

Designed a proof-of-concept cloud-ready web application to automate purchase, delivery & installation of SSL certificates for services hosted on Amazon AWS.

Microsoft R&D*Software Engineering Intern***Hyderabad, India***Summer 2016*

Integrated Azure AD cloud authentication/authorization service into ASP.NET Core.

Bhaskaracharya Institute for Space Applications and Geoinformatics*Summer Intern***Gujarat, India***Summer 2014*

Developed image processing software for stitching and geo-registration of large satellite images.

Google Summer of Code*Open-source Intern***Apache Software Foundation***Summer 2013*

Document version-control toolbar integrated with cloud repositories in Apache OpenOffice.

Publications

- Rajath Shashidhara, Timothy Stamler, Antoine Kaufmann, and Simon Peter.
FlexTOE: Flexible TCP Offload with Fine-Grained Parallelism.
USENIX Symposium on Networked Systems Design and Implementation (NSDI 22), Apr 2022.
arXiv: 2110.10919, Oct 2021.
- Jitender Singh Shekhawat, Rishabh Agrawal, K Gautam Shenoy, and Rajath Shashidhara.
A Reinforcement Learning framework for QoS-driven radio resource scheduler.
IEEE Global Communications Conference (GLOBECOM 20), Dec 2020.
DOI: 10.1109/GLOBECOM42002.2020.9322182
- Tridev Mishra, Rajath Shashidhara, Tapomoy Guha Sarkar and Jayendra N. Bandyopadhyay.
Phase transition in an Aubry-André system with a rapidly oscillating magnetic field.
APS Physical Review A, Nov 2016.
DOI: 10.1103/PhysRevA.94.053612

Theses

- **TASNIC: a flexible TCP offload with programmable SmartNICs.**
Master's Thesis, *The University of Texas at Austin*, May 2021.
DOI: 10.26153/tsw/14442
- **Driven Aubry-André-Harper systems.**
Master's Thesis, *Birla Institute of Technology and Science, Pilani*, Dec 2016.

Talks

- **FlexTOE: Flexible TCP Offload with Fine-Grained Parallelism**
 - Google Networking Research Summit, March 2022
 - VMware, March 2022
 - USENIX Symposium on Networked Systems Design and Implementation (NSDI 22), April 2022
 - SmartNICs Summit 2022, San Jose, CA
 - Microsoft, April 2023

Awards

Best Student of Batch 2017: adjudged by Dept. of Physics, BITS Pilani

BITS Pilani MCN Scholarship: 80% tuition waiver for all semesters (top 5% of 800 students)

Prof. I J Nagrath Student Project Fund: awarded by BITSAA & Dept. of EE, BITS Pilani

Samsung Annual Excellence Awards: organization-wide award for technical excellence

Samsung Professional Software Competency: held by < 10% employees globally when certified

Service

- **EuroSys 2022:** Shadow PC
- **OSDI 2022:** Artifact Evaluation Committee
- **USENIX ATC 2022:** Artifact Evaluation Committee

Teaching

- **Datacenters:** Spring 2022, University of Washington
- **Cloud Computing:** Spring 2020, The University of Texas at Austin (*Score: 4.8/5*)

Skills

Languages: C/C++, Java, Python (+numpy/matplotlib/PyTorch), Go, Julia, \LaTeX , P4, JavaScript

Frameworks: MPI, OpenMP, Pthreads, DPDK, NodeJS, Kubernetes, Linux Kernel

Tools: git, gdb, make, valgrind, strace, perf, qemu-kvm