Rajath Shashidhara

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Education

University of Washington **Seattle, WA**
Ph.D. Computer Science *2021–Present*
Advisor: Dr. Simon Peter
Areas: Systems & Networking

The University of Texas at Austin **Austin, TX**
M.S. Computer Science *2019–2021*
GPA: 4.0/4.0
Coursework: Operating Systems, Datacenters, Virtualization, Distributed Systems

Birla Institute of Technology and Science **Pilani, India**
M.Sc. Physics + B.E. Computer Science *2012–2017*
GPA: 9.01/10 Distinction Class
Awarded **Best Student of Batch 2017**
Advisors: Dr. Tapomoy Guha Sarkar & Prof. Sundar Balasubramaniam

Research

Google, Systems Research Group **Seattle, WA**
Student Researcher *2022–Present*
Collaborators: *Kim Keeton, Stanko Novakovic*

Understanding the impact of tiered memory on application performance at datacenter scale. (Ongoing)
- Forked the production kernel to emulate swap backends with arbitrary latency and bandwidth characteristics.
- Designed a large-scale experiment to study the effects of swapping on applications running in the fleet.
- Developed a methodology to synthesize representative benchmarks for memory tiering.

University of Washington / The University of Texas at Austin **Seattle, WA / Austin, TX**
Graduate Research Assistant *2019–Present*
Collaborators: *Simon Peter, Antoine Kaufmann, Marco Canini, Arvind Krishnamurthy*

TCP offload architecture for 400G+ networks. (Ongoing)
- Design and development of TCP offload for 400G and beyond network speeds.
- Evaluation of different hardware architectures for high performance and energy efficiency.

Energy-efficient ML pre-processing acceleration. (Ongoing)
- In-network data ingestion acceleration for large-scale ML training with emphasis on energy efficieny.

FlexTOE: Flexible TCP offload with Fine-Grained Parallelism. (NSDI '22)
- Full stateful offload of TCP data-path to SmartNIC – frees CPU cores from TCP overhead.
- Fine-grained parallelization of the TCP data-path to achieve high performance on wimpy SmartNIC cores.
- Highly extensible offload with support for eBPF-based extensions.
- Memcached scales up to 38% better versus TAS kernel-bypass TCP stack saving 50% per-request CPU cycles.

Samsung Research **Bangalore, India & Suwon, South Korea**
Senior Software Engineer (Research) *2017–2019*
Advisors: *Anshuman Nigam, Dojun Byun*
5G Radio Access Network data-plane R&D.
- Involved in the development of world's first pre-5G mobile user equipment.
- Data-plane technical support for the 5G demo at *Winter Olympics (South Korea, 2018).*
- *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)
- 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 **Pilani, India**
Research Student *2015–2016*
Collaborators: *Tapomoy Guha Sarkar, Jayendra N. Bandyopadhyay*
Quantum Chaos in Aubry-André-Harper electron systems. (PhysRevA '16)
- Studied phase transitions in Hofstadter's butterfly under time-varying magnetic field and the relationship between topological invariants and Hall conductivity.
- Simulated and computationally evaluated solutions to Schrodinger's equation for special quantum systems using perturbation methods and computational physics algorithms.

National Central University **Zhongli, Taiwan**
Undergraduate Research Assistant *Summer 2015*
Advisor: *Ko Chung-Ming*
Gravitational lensing in elliptical galaxies.
- Analytically derived the gravitational lensing equation for elliptical galaxies.
- Developed a *distributed recursive sub-gridding* algorithm to numerically simulate the lensing.

Industry Experience

Confluent **Mountain View, CA**
Software Engineering Intern *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 **Bangalore, India**
Software Engineering Intern *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 **Hyderabad, India**
Software Engineering Intern *Summer 2016*
Integrated Azure AD cloud authentication/authorization service into ASP.NET Core.

Bhaskaracharya Institute for Space Applications and Geoinformatics **Gujarat, India**
Summer Intern *Summer 2014*
Developed image processing software for stitching and geo-registration of large satellite images.

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

Last updated on August 12, 2023.