

Rajath Shashidhara

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Education

University of Washington <i>Ph.D. Computer Science</i> Advisor: Dr. Simon Peter Areas: Systems & Networking	Seattle, WA 2022–Present
The University of Texas at Austin <i>M.S. + Ph.D. Computer Science, GPA: 4.0/4.0</i> Coursework: Operating Systems, Datacenters, Virtualization, Distributed Systems Teaching: Cloud Computing (Spring 20)	Austin, TX 2019–2021
Birla Institute of Technology and Science <i>M.Sc. Physics + B.E. Computer Science, GPA: 9.01/10 Distinction Class</i> Awarded Best Student of Batch 2017 Advisors: Dr. Tapomoy Guha Sarkar & Prof. Sundar Balasubramaniam	Pilani, India 2012–2017

Research Experience

The University of Texas at Austin <i>Graduate Research Assistant</i> Advisor: Dr. Simon Peter	Austin, TX 2019–2021
Flexible TCP offload to programmable SmartNICs with Fine-grained Parallelism (*in review*) <ul style="list-style-type: none">Full stateful offload of TCP packet processing to SmartNIC – frees CPU cores from TCP overhead.Data transfer directly from application memory to wire, eliminating OS and context switch overheads.Memcached scales up to 38% better versus TAS, while saving 81% CPU cycles versus Chelsio ToE.	
Distributed file systems with Client-Local NVMs <ul style="list-style-type: none">Scaling client-local NVM filesystems like Assise beyond rack-scale.In-network caching, coordination and coherence mechanisms on programmable switches.	
Distributed key-value store with co-located Serverless compute <ul style="list-style-type: none">Aggregate compute and storage to exploit data locality.Improves execution time of serverless compilation workloads by 1.6x and 5x reduction in data movement compared to conventional disaggregated deployments.	
SRoCE: Software RDMA over Commodity Ethernet <ul style="list-style-type: none">Software-based flexible RDMA verbs implementation using high performance user-space TCP stack.Achieved 3x single-connection throughput for one-sided 1000 bytes RDMA ops as compared to H/W RDMA NICs.	
Improving connection scalability of TAS: datacenter TCP stack <ul style="list-style-type: none">Increased throughput by 10% at 100k connections by improving TCP pacing and congestion control.	
Samsung Research <i>Senior Software Engineer (Research)</i> Advisors: Anshuman Nigam & Dr. Dojun Byun	Bangalore, India & Suwon, South Korea 2017–2019
5G Radio Access Network data-plane R&D <ul style="list-style-type: none">Involved in the development of world's first pre-5G mobile user equipment.Data-plane technical support for the 5G demo at <i>Winter Olympics (South Korea, 2018)</i>.<i>Parallelization, memory management and flow control</i> research: improved throughput, ultra-low latency reliable transport, and reduced memory footprint on 5G Distributed Units.	
Reinforcement Learning based radio-resource schedulers <ul style="list-style-type: none">Modeled scheduling as a Partially Observable Markov Decision Process to solve multi-objective optimization in stochastic input-driven environments. (GLOBECOM'20)	

Birla Institute of Technology and Science

Research Student

Advisor: Dr. Tapomoy Guha Sarkar

Pilani, India

2015–2016

Studying Quantum Chaos in Aubry-André-Harper electron systems

- Studied phase transitions in Hofstadter's butterfly under time-varying magnetic field and the relationship between topological invariants and Hall conductivity. (PhysRevA'16)
- Simulated and computationally evaluated solutions to Schrodinger's equation for special quantum systems using perturbation methods and computational physics algorithms.

Advisor: Prof. Sundar Balasubramaniam

Fast semantic matching of strings in Context-Free Grammars

- Designed a framework to develop semantic hash functions of parse trees in domain-specific CFGs.
- Demonstrated the efficiency and expressiveness by finding semantic duplicates in a large XML DB.

National Central University

Undergraduate Research Assistant

Advisor: Dr. Ko Chung-Ming

Zhongli, Taiwan

Summer 2015

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

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.

Projects

IoT enabled Laboratory Environment: Project SmartLAB

Undergraduate Researcher

BITS, Pilani

2012-2013

Proactive lab monitoring and activity tracking using sensor networks, speech and gesture recognition

- Awarded *Prof. I J Nagrath Student Project Fund* by Dept. of Electrical Engineering, BITS Pilani.
- Won 2nd place in *Siemens Home Automation challenge*.
- Blog: <https://smartlabbits.wordpress.com>

Awards

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

BITS Pilani MCN Scholarship: 80% tuition fee waiver for all semesters (top 5% in a batch 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 obtained

Service

EuroSys 2022: Shadow PC

Preprints

Rajath Shashidhara, Timothy Stamler, Antoine Kaufmann, and Simon Peter.

FlexTOE: Flexible TCP Offload with Fine-Grained Parallelism.

arXiv: 2110.10919, Oct 2021.

Publications

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), 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

Skills

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

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

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