Rajath Shashidhara

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Education

The University of Texas at Austin Aug 2019 - Present
M.S. in Computer Science GPA: 4.0/4.0
Courses: Advanced Operating Systems, Datacenters, Virtualization, Distributed Computing
Teaching Experience: Cloud Computing [Spring 2020]

Birla Institute of Technology & Science (BITS), Pilani, India Aug 2012 – June 2017
M.Sc. (Hons.) in Physics GPA: 9.01/10
B.E. (Hons.) in Computer Science Distinction Class
Courses: Parallel Computing, Operating Systems, Computer Networks, Data Mining, Information Retrieval
Adjudged **Best Student of Batch 2017** by Department of Physics for outstanding academic and research track record

Experience

Samsung Research, Bangalore, India July 2017 – Aug 2019
Senior Software Engineer (Research), Communication R&D Division

- Developed the fast data-plane radio access network stack (PDCP, RLC, MAC) for the world's first Pre-5G mobile user equipment. Technical support for the 5G demo at *PyeongChang Winter Olympics* (Korea, 2018)
- Research on *parallelization, memory management & flow control* to improve throughput and reduce memory footprint of datapath of 5G NR Distributed Unit (commercialized in USA & Korea) on native & NFV platforms
- Developed *Reinforcement Learning based Radio-Resource Scheduling* – multi-objective optimization in stochastic input-driven environments using Deep Q-Networks (DQN) & adapted policy iteration
- Presented with *Samsung Technical Excellence Award* for no critical S/W bugs in bare-metal real-time code

Symantec, Bangalore, India Jan 2017 – June 2017
Software Engineering Intern, Website Security Development Team

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

Microsoft, Hyderabad, India May 2016 – July 2016
Software Engineering Intern

- Integrated Azure AD cloud authentication/authorization service into ASP.NET Core based web applications

Google Summer of Code June 2013 – Sept 2013
Open-source Software Development Intern, Apache Software Foundation (OpenOffice)

- Developed an in-app document version control toolbar which connects to cloud content repository

Research

SRoCE: Software RDMA over Commodity Ethernet Aug 2019 – Dec 2019
Advisors: Prof. Simon Peter & Prof. Chris Rossbach, UT Austin [Code] [Paper]

- Software-based flexible RDMA verbs implementation using high performance user-space TCP stack
- Achieved 3x single-connection throughput for 1000 bytes RDMA ops as compared to H/W RDMA NICs

Improving connection scalability in datacenter user-space TCP stacks Aug 2019 – Dec 2019
Advisors: Prof. Simon Peter, UT Austin [Code] [Paper]

- Designed and conducted experiments to identify bottlenecks in TAS: TCP acceleration for datacenters
- Increased throughput by 10% at 100k connections by improving TCP shaping and congestion control module

Studying Quantum Chaos in Aubry-André electron systems Aug 2015 – Dec 2016
Advisor: Prof. Tapomoy Guha Sarkar, BITS Pilani [Code] [Paper] [Thesis]

- 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

Distributed Combinatorial Optimization on a Cluster Mar 2016 – May 2016
Advisor: Prof. Sundar Balasubramaniam, BITS Pilani [Code] [Design]

- Designed a distributed algorithm to efficiently perform *Branch & Bound search* on a commodity cluster
- Developed a load balancing technique based on *peer-to-peer diffusion* between nodes on toroid communication topology and *leftist-heap based work-stealing queues* between threads

Gravitational lensing in Elliptical Galaxies
May 2015 – July 2015

Advisor: Prof. Ko Chung-Ming, National Central University, Taiwan [Code] [Report]

- Analytically derived the gravitational lensing equation for elliptical galaxies. Developed a *distributed recursive sub-gridding* algorithm to find the solution on a cluster and simulate the lensing

Satellite Image Stitching using Feature Recognition
May 2014 – July 2014

Bhaskaracharya Institute of Space Applications & Geoinformatics, Gandhinagar, India [Code] [Report] [Slides]

- Surveyed existing literature on algorithms to *stitch large satellite images* into a mosaic. Evaluated performance of OpenCV implementations of SIFT & SURF algorithms on large datasets of satellite images

Projects

Fast Semantic matching of strings generated by Context Free Grammar
Jan 2016 – May 2016

Advisor: Prof. Sundar Balasubramaniam [Code] [Design]

- Designed a language for domain experts to express *semantic equivalence based on parse tree* structure.
- Developed a *hash function* to hash parse trees based for fast matching. Experimented on XML DBs

Persistent storage with C++ STL abstraction
Oct 2015 – Mar 2016

- Implemented *templatized out-of-core (secondary storage) data structures* (B+ Trees, Vectors) with STL interface. User-space applications simply need to relink with library for persistent structures [Code]
- Customized *buffer caches* bypassing the kernel, *async I/O* for high efficiency
- Built a proof-of-concept TF-IDF based Search Engine using this library that scales beyond primary memory limits (> 100GB) [Code]

IoT enabled Laboratory Environment: Project SmartLAB
Aug 2012 – Dec 2013

- Proactive lab monitoring and activity tracking using *sensor networks, speech and gesture recognition* [Code]
- Awarded *Prof. I J Nagrath Student Project Fund* by Dept. of Electrical Engineering, BITS Pilani [Link]

Publications

Phase transition in an Aubry-André system with a rapidly oscillating magnetic field
[Link]

Tridev Mishra, Rajath Shashidhara, Tapomoy Guha Sarkar, and Jayendra N. Bandyopadhyay

Phys. Rev. A 94, 053612 – Published 14 November 2016

A metric oblivious approach to Radio-Resource Allocation using Reinforcement Learning

Rajath Shashidhara, Jitender Singh Shekhawat and Anshuman Nigam, **Samsung Research**

Submitted for publication

Honors & Achievements

- **Best Outgoing Student of Batch 2017 Award** – adjudged by Department of Physics, BITS Pilani for outstanding academic and research track record
- **Prof. I J Nagrath Student Project Fund** for Project SmartLAB – awarded by BITSAA and adjudged by Department of Electrical and Electronics Engineering, BITS Pilani
- **BITS Pilani MCN Scholarship Award** – 80% tuition fee waiver for all semesters for consistent academic performance (top 5% in a batch of 800 students)
- **Samsung Professional Software Competency Certification** – held by < 10% employees globally
- **Samsung Annual Excellence Awards** – Outstanding Project of the Year 2018-19
- **Samsung Citizen Awards** – organization-wide award for technological excellence and quality of code

Skills

- **Languages:** C, C++, Java, Python (+numpy/scipy/matplotlib/PyTorch), Julia, LaTeX, JavaScript
- **Frameworks:** Linux, MPI, OpenMP, Pthreads, ODP, DPDK, ns-3, NodeJS, AWS, Azure
- **Tools:** git, gdb, make, valgrind, strace, qemu, kvm