Shashank Gugnani

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Research Interests

High performance filesystems and storage, virtualization, cloud computing, big data, high performance networking, RDMA, and network-based computing

Education

The Ohio State University, Columbus, OH — 2015 - 2021
Ph.D., Computer Science
Advisor: Xiaoyi Lu

BITS-Pilani, India — 2011 - 2015
B.E., Computer Science

Work Experience

Graduate Research Associate — Aug 2020 - Dec 2020
Department of Computer Science, — Aug 2015 - May 2019
The Ohio State University
Role: Designing storage systems for next-generation cloud environments

Research Intern — June 2020 - Aug 2020
Storage Systems Research Group, — May 2019 - Aug 2019
IBM Research – Almaden
Role: Designing software to make persistent memory easier to use

Graduate Teaching Associate — Aug 2019 - May 2020
Department of Computer Science, — Aug 2015 - May 2016
The Ohio State University
Role: Instructor for CSE 1223: Introduction to Programming in Java
Previous Role: Grader for CSE 2331: Algorithms and CSE 3421: Computer Architecture

Visiting Researcher — Jun 2014 - Dec 2014
Centre for Parallel Computing,
University of Westminster, London
Role: Extending scientific workflow systems to support MapReduce workloads

Achievements and Activities

- Selected as participant for ACM Student Research Competition at SC'18 and SC'17
- Awarded student travel grant for SC'18, SC'17, NVMW'18, and HiPC'17
- Presented talks at Data Works Summit'18, HiPC'17, CloudCom'16, and IDCS'14
- Presented tutorials at IISWC'20 and SC'18
- External reviewer for IEEE TPDS, MASCOTS'19, IPDPS'18, and ICS'17

Research Projects

***Memory Fabric: Data Management for Large-Scale Hybrid Memory Systems*, National Science Foundation, Oct'18 - Dec'20**
Role: Designing new abstractions and mechanisms to allow storage systems to efficiently utilize non-volatile memory.

***NeuroHPC: Advanced Computational Neuroscience*, National Science Foundation, Sep'16 - May'19**

Role: Developing scalable solutions for linear fascicle evaluation of the brain connectomme with MPI. Resulting designs are publicly available on docker hub (link).

***HiBD: Scalable Middleware for Managing and Processing Big Data on Next Generation HPC Systems*, National Science Foundation, Aug'15 - Aug'17**
Role: High-performance designs for HBase and Hadoop with RDMA. Developed designs were distributed as publicly available software releases (link).

***Chameleon: A Large-Scale, Reconfigurable Experimental Environment for Cloud Research*, National Science Foundation, Aug'15 - Sep'17**
Role: Design and development of high-performance Big Data middleware and appliances for next-generation cloud environments. Developed appliances were made publicly available through the Chameleon appliance catalog (link).

***CloudSME: Cloud-based Simulation Platform for Manufacturing and Engineering*, European Commission FP7 Capacities, Jun'14 - Dec'14**
Role: Extended scientific workflow systems to support MapReduce based applications in the cloud. As part of the project, optimal strategies for infrastructure management and integration with workflows were developed (link).

Patent Applications

1. **S. Gugnani**, S. Guthridge, F. Schmuck, T. Anderson, and D. Bhagwat, "Fine-Grained Forced Cache Eviction", US Patent 201909738

Select Refereed Publications

1. **S. Gugnani**, T. Li, and X. Lu, "NVMe-CR: A Scalable Ephemeral Storage Runtime for Checkpoint/Restart with NVMe-over-Fabrics", IPDPS 2021
2. **S. Gugnani**, A. Kashyap, and X. Lu, "Understanding the Idiosyncrasies of Real Persistent Memory", VLDB 2021
3. T. Li, D. Shankar, **S. Gugnani**, and X. Lu, "RDMP-KV: Designing Remote Direct Memory Persistence based Key-Value Stores with PMEM", SuperComputing 2020
4. **S. Gugnani**, X. Lu, and D.K. Panda, "Analyzing, Modeling, and Provisioning QoS for NVMe SSDs", UCC 2018
5. **S. Gugnani**, X. Lu, H. Qi, L. Zha, and D.K. Panda, "Characterizing and Accelerating Indexing Techniques on Distributed Ordered Tables", IEEE Big Data 2017
6. **S. Gugnani**, X. Lu, and D.K. Panda, "Swift-X: Accelerating OpenStack Swift with RDMA for Building an Efficient HPC Cloud", CCGrid 2017
7. X. Lu, D. Shankar, **S. Gugnani**, and D.K. Panda, "High-Performance Design of Apache Spark with RDMA and Its Benefits on Various Workloads", IEEE BigData 2016
8. **S. Gugnani**, C. Blanco, T. Kiss, and G. Terstyanszky, "Extending Science Gateway Frameworks to Support Big Data Applications in the Cloud", Journal of Grid Computing, 2016

Software Skills

- C, C++, Java, UNIX/Linux, git, RDMA, NVMe, PMEM, QEMU, Hadoop/Spark, OpenStack, and others