

Justin Miron

110 Lake Street, Ithaca, NY - justinmiron@cs.cornell.edu - (810)-841-8557

EDUCATION

Ph.D. Student, Cornell University

August 2017 - May 2022 (Anticipated)

Department of Computer Science

Advisor: [Rachit Agarwal](#)

B.S., University of Illinois at Urbana-Champaign

August 2013 - May 2017

Department of Computer Engineering

Advisor: [Laxmikant Kale](#)

RELEVANT COURSEWORK

Graduate Computer Networks, Graduate Distributed Algorithms, Distributed Systems, Networking with Big Data, Algorithms and Models of Computation, Operating System Design

RESEARCH INTERESTS

Distributed systems, datacenter networking, and peer-to-peer systems

RESEARCH PROJECTS

Storage-aware scheduling for disaggregated datacenters

Work with [Rachit Agarwal](#) that seeks to build a system that efficiently utilizes ephemeral storage on compute nodes in disaggregated datacenters to reduce the cost of storage traffic traversing the network. Our approach involves co-designing scheduling and storage management to optimize for network traffic and storage utilization while maximizing utilization.

Frequency analysis resilient databases

This work with Professors [Rachit Agarwal](#) and [Tom Ristenpart](#) involves augmenting encryption techniques to decrease the efficacy of frequency analysis attacks on databases.

UNDERGRADUATE RESEARCH PROJECTS

Parallel object replication for scalable parallel processing

Senior Thesis

By allowing a parallel runtime systems to adaptively replicate overloaded processing elements and load balance requests between replicas, the system may reduce the overhead of any given element. This work involved developing a replication cost model, identifying consistency requirements for different requests, and implementing the system in Charm++¹

Elastic distributed computation for hpc in the cloud

Senior Thesis

Modified a parallel runtime system to efficiently support elastic parallel applications in the cloud. Improvements investigated the similarities between proactive fault tolerance techniques and requirements of elastic compute. Optimized these fault tolerance techniques for bulk operations allowing for elastic compute.

Bounded memory-efficient concurrent lock-free queue

Parallel Programming Lab

Designed a multi-producer multi-consumer lock-free queue that allowed for a configurable upper bound and memory usage linear with the queue size. Memory reclamation was handled through providing provable bounds on accessible memory by producers and consumers in the queue. Used as a single messaging buffer per node for symmetric multiprocessing in Charm++¹, providing a 7% reduction on round-trip message times.

¹ [Charm++](#) is a object-based parallel programming language. The objects are the elements of execution and are distributed across machines.

Rendezvous protocol for no-copy RDMA messaging

Parallel Programming Lab

This work seeked to realize the capabilities of RDMA as a basis for asynchronous messaging operations on CRAY super computers in Charm++¹ without the need for message copy operations.

WORK EXPERIENCE

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| Summer 2017 | Software Engineering Intern at Microsoft, Aliso Viejo, CA Azure Data Warehouse Group Built a distributed query store prototype for more extensive monitoring and debugging of distributed queries. |
| December 2017 - May 2017 | Software Engineer at Charmworks Inc., Champaign, IL Optimized a parallel runtime system, Charm++ ¹ , for high performance computing applications. Modified shared memory parallel applications to operate scalably in a distributed memory context. |
| February 2016 - May 2017 | Research Assistant at University of Illinois at Urbana-Champaign, Urbana, IL Parallel Programming Lab Performed research under Professor Laxmikant Kale to reduce and improve communication patterns in parallel algorithms and runtime systems. |
| Summer 2016 | Software Engineer, Tools and Infrastructure Intern at Google, Seattle, WA Google Compute Engine Worked with the Google Compute Engine infrastructure team to implement methods for network failure detection and debugging for the Google Compute Engine. |
| Summer 2015 | Software Engineering Intern at ViaSat Inc., Carlsbad, CA Antenna Control Unit Group Expanded an antenna control unit simulator to support real-time message modification and support for new antenna types. |

RELEVANT TEACHING EXPERIENCE

Database Systems, Cornell University, *Teaching Assistant*

Aug 2017 - Dec 2017

Data Structures, University of Illinois at Urbana-Champaign, *Course Assistant*

Aug 2015 - May 2017

PROGRAMMING SKILLS

Languages: C, C++, C#, Python, Java

Parallel Programming & Systems: Pthreads, MPI, OpenMP, Charm++, Map-Reduce, Spark