Ryan Marcus

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PROFILE

I am a Ph.D. student in computer science at Brandeis University. My research currently focuses on cloud databases and scheduling problems. I graduated with honors from the University of Arizona, where I took courses in computer science, gender and women's studies, and mathematics.

EDUCATION

Brandeis University, 2014 - now. Ph.D. student in Computer Science.

- Big Data Analysis
- Abstract Algebra
- Statistical Machine Learning
- Database Systems
- Operating Systems
- Theory of Computation
- Artificial Intelligence
- Distributed Systems

University of Arizona Honors College, 2010-2014. Computer science, mathematics and gender studies.

- Compilers
- Databases
- Parallel Programming
- Object Oriented Programming
- Algorithms
- Symbolic Logic
- Analytic Geometry
- Discrete Math

EXPERIENCE

Brandeis University with Dr. Olga Papaemmanouil 2014 - now

As one of Dr. Papaemmanouil's students, I research cloud database systems. My work has focused on applying machine learning to query scheduling as well as other classically hard problems.

Los Alamos National Laboratory (HPC-5) with Cornell Wright 2014 - now

I developed a framework for automatically analyzing the performance of scientific codes. Our work used machine learning techniques to extract critical insights from hotspot profiles, CPU usage readings, MPI traces, and version control systems. Insights from this framework enabled us to drastically reduce the memory usage of one of the laboratory's large Fortran codes.

The University of Arizona with Dr. Richard Snodgrass 2013-2014
I wrote my undergraduate thesis with direction from Professor Snodgrass. I designed and implemented a suite of validation tools for AMELIE, a project that studies the intricacies of causal modeling. I have also been involved in planning the overall structure of the project, and I helped implement the first prototype.

Los Alamos National Laboratory (AET-6) with Dr. William Ward 2013
I worked with Dr. Ward on the laboratory's 3D reconstruction code, RECON. I designed parallel versions of many serial algorithms and implemented them on GPGPUs, and I designed a fast algorithm to approximate median filters. Overall, my work improved the performance of RECON by a factor of three.

The University of Arizona with Dr. Shaughan Lavine 2012-2013
Dr. Lavine and I developed a novel Monte Carlo algorithm for finding functional dependencies within large databases. We employed various HPC techniques to accelerate the algorithm, and we were able to optimize several production database schemas at the UofA.

Los Alamos National Laboratory (XCP-3) with Dr. Larry Cox 2009-2012
I work with Dr. Cox on Los Alamos' premier Monte Carlo particle transport code, MCNP. My work includes co-design for exascale applications as well as working with a large Fortran project. Some of our work was presented at SC10 and SC11.

Arizona College Debate Team 2010-2014
I participated in competitive collegiate policy debate, which included synthesizing thousands of scholarly articles into succinct arguments. I advanced to the top 10% of all debaters, participating at three national championship tournaments. I also worked as a volunteer debate coach for Catalina Foothills High School.

PAPERS

Marcus, Ryan C. "Techniques for Automated Performance Analysis" LA-UR-14-26577, OSTI 1154980 ; 2014

Marcus, Ryan C ; Ward, William C. "DP: a Fast Median Filter Approximation" LA-UR-13-25331, OSTI 1088342 ; 2013

Marcus, Ryan C. "MCMini: Monte Carlo on GPGPU" LA-UR-12-23206, OSTI 1047072 ; 2012

Cox, Lawrence J ; Marcus, Ryan C. "Developing a Monte Carlo mini-app for exascale co-design" LA-UR-11-06085, OSTI 1074563 ; 2011

PRESENTATIONS

Marcus, Ryan C. "Machine Learning for Humans" for the Los Alamos National Laboratory Data Science Summer School ; 2015.

Marcus, Ryan C. "Shared Memory for Many-Core: A Hydrodynamics Case Study" for the Los Alamos National Laboratory Research Symposium, LA-UR-15-25303 ; 2015.

POSTERS

Marcus, Ryan C. "Shared Memory for Many-Core: A Hydrodynamics Case Study" for the Los Alamos National Laboratory Research Symposium poster session in July, LA-UR-15-25303 ; 2015.

Marcus, Ryan C. "Matriarch: A Framework for Automated Performance Analysis" for the Los Alamos National Laboratory Research Symposium ; 2014.

AWARDS

- Computer Science Outstanding Teaching Fellow Award (Fall 14/Spring 15)
- 3-Day Startup Challenge Winner (2015)
- Brandeis University Michtom Fellowship (2014)
- National Debate Scholar, Summa Cum Laude (2013)