

LAUREL ORR

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OBJECTIVE

I am a graduate student in the Database Group at the University of Washington working towards a PhD in computer science. I desire to become an industrial researcher or professor where I can collaboratively work with other scientists to advance the state of knowledge in computer science.

EDUCATION

University of Washington, Seattle, WA

Expected August 2019

- PhD in Computer Science
- Advisors: Dan Suciu and Magdalena Balazinska
- GPA 3.95/4.0

Carleton College, Northfield, MN

June 2013

- Bachelor of Arts Degree, Computer Science
- Bachelor of Arts Degree, Mathematics
- GPA 3.96/4.0

SKILLS

- Java, Python, C, C++, Scheme, Javascript
- Tableau, Mathematica, Matlab, SAS, and SPSS Modeler
- Experience with GPU programming in CUDA
- Database experience using PostgreSQL, Microsoft SQL Server, and Apache Spark
- Cloud computing experience using AWS and Microsoft Azure
- Version control experience using Git, SVN, and Perforce
- Parallel programming experience using OpenMP, MPI, and Hadoop MapReduce
- Data visualization using D3

RELATED EXPERIENCE

Graduate Research, University of Washington Database Group, Seattle, WA

Fall 2013-Present

- (Open World Database) Created a prototype Open World Database system that inherently treats relations as samples of some population. Using apriori population-level aggregate constraints, the system automatically corrects for sample selection bias, allowing for data scientists to run approximate queries on the population.
- (Database Summarization) Researched and developed a queryable summary using probabilistic databases and the Principle of Maximum Entropy to help scientists quickly explore, summarize, and run ad-hoc queries on massive datasets. Resulted in a publication in VLDB 2017.
- (Data Analytics for Astronomy) In collaboration with astronomers at UW, built custom, interactive visualization on top of the UW Database Group's big data system, Myria, to calculate and display galactic merger trees from massive particle simulations. Resulted in a publication in the DanaC Workshop at SIGMOD 2014.

Summer Intern, Microsoft Research, Redmond, WA

Summer 2016, 2017

- Worked with mentor to develop a prototype data skipping technique that improves predicate pushdown by leveraging derived predicates to skip data over joins. Using block-level data statistics, derived predicates are created during query optimization and are applied on complex relational expressions. (Mentor: Srikanth Kandula)

Summer Intern, Tableau Software, Seattle, WA

Summer 2015

- Worked with small team to implement features of Tableau's online dashboard editor that were released to the public during the summer.
- Used collaborative software development tools such as Team Foundation Server and Perforce version control.

Year Round Intern, Software Systems Research and Development, Sandia National

Fall 2012-Spring 2015

Laboratories, Albuquerque, NM

- Continued on project from previous summers by expanding my graphics processor (GPU)-based computed tomography reconstruction algorithm to run on a cluster and improve performance in preparation for future-size datasets. (Mentor: Edward Jimenez, PhD)
- Used Matlab, SAS, and SPSS Modeler to build a model to predict employee Environment, Safety, and Health incidents. Used model results to discover leading predictive indicators and presented results to VPs and upper level management. (Mentor: Shawn Martin, PhD and Judy Spomer, Manager)
- Contributed to potential journal publications, reviewed literature from HPC related publications, and coded algorithms for a multitude of different imaging related projects. (Mentor: Edward Jimenez, PhD)

Senior Comprehensive Project, Mathematics, Carleton College*Winter-Spring 2013*

- Studied elliptic functions and modular forms through guided readings of authors Apostol and Koblitz. (Advisor: Mark Krusemeyer)

Senior Comprehensive Project, Computer Science, Carleton College*Fall 2012-Winter 2013*

- Built a social networking platform to be implemented as a Facebook application for Wikipedia contributors to connect through Facebook. (Advisor: Dave Musicant)

Summer Intern, Center for Cyber Defenders, Sandia National Laboratories, Albuquerque, NM*Summer 2012*

- Developed a graphics processor (GPU)-based computed tomography reconstruction algorithm for HPC that minimized hard disk I/O. My version improved scalability from 4 to 6 GPUs by maximizing resource allocation. (Mentor: Edward Jimenez, PhD)
- Enhanced encryption process for cloud data storage by implementing matrix operations over a finite field. (Mentor: David Zage, PhD)
- Was offered a year round internship because of my accomplishments.

Student Worker, Mathematics/Computer Science Department, Carleton College, Northfield, MN*Winter 2012-Spring 2013*

- Lectured once a week and held office hours for Calculus I course. (Fall 2012)
- Graded weekly assignments for introductory mathematics and computer science courses.
- Held weekly group tutoring sessions for Calculus II students. (Winter 2012)

Summer Research, Computer Science, Carleton College, Northfield, MN*Summer 2011*

- Created with a group a news article recommender system for Wikipedia users to increase user participation.
- Researched “sticky” citations in Wikipedia to discover criteria for a strong, reliable edit.

Summer Intern, Comcast Cable, Englewood, CO*Summer 2009*

- Researched customer service troubleshooting techniques for Comcast’s Video On Demand.
- Presented research findings and recommended improvements to senior business leaders.

PUBLICATIONS

- **EntropyDB: A Probabilistic Approach to Approximate Query Processing.** Laurel Orr, Magdalena Balazinska, Dan Suciu. *VLDB Journal*. 2019. (under submission)
- **Probabilistic Database Summarization for Interactive Data Exploration.** Laurel Orr, Magdalena Balazinska, Dan Suciu. *VLDB*. 2017.
- **Explaining Query Answers with Explanation-Ready Databases.** Sudeepa Roy, Laurel Orr, Dan Suciu. *VLDB*. 2015.
- **Big-Data Management Use-Case: A Cloud Service for Creating and Analyzing Galactic Merger Trees.** Sarah Loebman, Jennifer Ortiz, Lee Lee Choo, Laurel Orr, Lauren Anderson, Daniel Halperin, Magdalena Balazinska, Thomas Quinn, Fabio Governato. *SIGMOD Workshop on Data Analytics in the Cloud (DanaC)*.

2014.

- **Cluster-Based Approach to a Multi-GPU CT Reconstruction Algorithm.** Laurel J. Orr, Edward S. Jimenez, Kyle R. Thompson. *Conference Proceedings for the IEEE Nuclear Science Symposium and Medical Imaging Conference*. 2014.
- **Exploring Mediated Reality to Approximate X-ray Attenuation Coefficients from Radiographs.** Edward S. Jimenez, Laurel J. Orr, Mega L. Morgan, Kyle R. Thompson. *SPIE Optical Engineering + Applications*. 2014.
- **Irregular Large-Scale Computed Tomography on Multiple Graphics Processors Improves Energy-Efficiency Metrics for Industrial Applications.** Edward S Jimenez, Eric L Goodman, Ryeojin Park, Laurel J Orr, Kyle R Thompson. *SPIE Optical Engineering + Applications*. 2014.
- **Utilization of Virtualized Environments for Efficient X-ray Attenuation Approximation.** Edward S. Jimenez, Kyle R. Thompson, and Laurel J. Orr. *Conference Proceedings for the ASNT 23rd Research Symposium*. 2014.
- **Comparison of Computed Tomography Values from Industrial CT Systems to Measured X-ray Attenuation Values.** Kyle R. Thompson, Edward S. Jimenez, and Laurel J. Orr. *Conference Proceedings from the ASNT 23rd Research Symposium*. 2014.
- **A High-Performance and Energy-Efficient CT Reconstruction Algorithm to Reconstruct Multi-Terabyte Datasets.** Edward S. Jimenez, Laurel J. Orr, and Kyle R. Thompson. *Conference Proceedings for the IEEE Nuclear Science Symposium and Medical Imaging Conference*. 2013.
- **Rethinking the Union of Computed Tomography Reconstruction and GPGPU Computing for Industrial Applications.** Edward S. Jimenez and Laurel J. Orr. *Conference Proceedings for the Penetrating Radiation Systems and Applications XIV Workshop at the SPIE International Symposium on SPIE Optical Engineering+Applications*. 2013.
- **Preparing for the 100-Megapixel Detector: Reconstruction a Multi-Terabyte Computed Tomography Dataset.** Laurel J. Orr and Edward S. Jimenez. *Conference Proceedings for the Penetrating Radiation Systems and Applications XIV Workshop at the SPIE International Symposium on SPIE Optical Engineering+Applications*. 2013.
- **An Irregular Approach to Large-Scale Computed Tomography on Multiple Graphics Processors Improves Voxel Processing Throughput.** Edward S. Jimenez, Laurel J. Orr, and Kyle R. Thompson. *Conference Proceedings for the Conference on High Performance Computing Networking, Storage and Analysis, SC 2012, Workshop on Irregular Applications: Architectures and Algorithms (IA³)*. 2012.

PATENTS

- **Cluster-Based Modularized Approach to GPU-based Computed Tomography with Non-Linear Load Balancing and Node-Interconnect,** Edward S. Jimenez and Laurel J. Orr, July 2013.
- **Modularized Approach to GPU-based Computed Tomography Improves Global Performance in High-Performance Systems,** Edward S. Jimenez and Laurel J. Orr, February 2013. (provisional)

PRESENTATIONS

- **MyMergerTree Service: Creating Galactic Merger Trees using Myria.** Presented by Laurel Orr, Sarah Loebman, Jennifer Ortiz, and Daniel Halperin. Demo poster at SIGMOD 2014 (in the context of the group Myria demo).
- **High Performance Cluster-Based Approach to GPU-Based Computed Tomography.** Presented by Laurel Orr. Center for Cyber Defenders Summer Intern Work Summary Poster Session at Sandia National Laboratories, August 2013.
- **Optimized HPC Approach to CT Reconstruction.** Presented by Laurel Orr. Center for Cyber Defenders Summer Intern Work Summary Poster Session at Sandia National Laboratories, August 2012.
- **Optimized HPC Approach to CT Reconstruction with GPUs.** Presented by Laurel Orr. DATACon Peer Reviewed Research Poster Session at Sandia National Laboratories, August 2012.

LEADERSHIP/INVOLVEMENT

Vice President, Carleton Computing Society

Spring 2012-Spring 2013

- Organized coding competitions and events for computer science enthusiasts
- Encouraged new students to get involved with the computer science culture and meet the department students

Student Athlete, Cross Country/Track & Field, High School/Carleton College

Summer 2007-Spring 2011

- Dedicated 23+ hours a week to training and competition while maintaining a full course load
- Worked with teammates to accomplish team and individual goals

Tutor, Acting in the Community Together (ACT) Office, Carleton College

Fall 2009-Spring 2010

- Worked one-on-one with a high school student in Mathematics
- Developed creative ways to explain properties and relations of Mathematics

HONORS/ACHIEVEMENTS

- Valedictorian, Cherry Creek High School, Greenwood Village, CO
- Dean's List, Carleton College
- Clare Boothe Luce Scholar, Carleton College
- Phi Beta Kappa
- Pastry-Powered T(o)uring Machine Endowed Fellow
- NSF GRFP Fellow
- NCWIT Honorable Mention

2009

2009-2013

Summer 2011

Since 2013

2013-2014

2015-2020

2018