Ronald J. Nowling

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Education

University of Notre Dame, Notre Dame, IN — August 2010 – Present
- Ph.D. Candidate in Computer Science & Engineering — (Expected) Fall 2015
- M.S. in Computer Science & Engineering — (Expected) Spring 2015

Eckerd College, St. Petersburg, FL — August 2006 – May 2010
- B.S. Computer Science, Mathematics
- Thesis: *Nature-inspired Metaheuristics for Combinatorial Optimization Problems*

Skills

- Fields: Software Engineering, Math Modeling, Computational Physics, Distributed Systems, Machine Learning, Bioinformatics, Open Source
- Programming Languages: Python, Java, Go, C/C++, Scala, Clojure, CUDA, Erlang, bash, SQL
- Software Engineering:
  - Paradigms: Object-oriented, Functional, Distributed, Parallel, and GPU programming
  - Testing: Unit Testing (Python unittest, JUnit, ScalaTest), Continuous Integration (Jenkins)
  - Version Control: Git, Mercurial, SVN
  - Build Systems: Gradle, sbt, Maven, lein, CMake
- Distributed Systems and Parallel Frameworks: Spark, Mesos, Condor, SGE, MPI, CUDA
- Infrastructure: Docker, Vagrant, AWS, OpenStack, Ansible
- Databases: MySQL, SQLite

Professional Experience

Software Engineer, Red Hat, Inc., Raleigh, NC — June 2014 – Present
- Internal analytics projects
- RPM packaging, integration testing, and deployment of internal analytics stack
- Provisioning, configuration, and administration of clusters
- Contributor to Apache Spark and Apache BigTop projects

Committer, Apache Bigtop — March 2015 – Present

Research Assistant, University of Notre Dame, Notre Dame, IN — August 2010 – Present
GAANN Fellow (Fall 2012 – Spring 2014)

Teaching Assistant, University of Notre Dame, Notre Dame, IN August 2010 – May 2013
Received Kaneb Center Outstanding Teaching Assistant Award (2012)

Simbios OpenMM Visiting Scholar, Stanford University, Stanford, CA July 30 – August 24, 2012

Undergraduate Research Assistant, University of Connecticut Summers 2005 – 2010
Farmington, CT

Ford Scholar and Research Assistant, Eckerd College, Summer 2007 – Spring 2010
St. Petersburg, FL

Selected Modeling and Analytics Projects

- BigPetStore Data Generator – Generator for transaction data with temporal and geospatial patterns for a fictional chain of pet stores.
- BigPetStore Spark – Apache Spark-based analytics demo application.
- BigTop Bazaar – Simulator for conference attendee movement time-series data incorporating booth preferences.
- Stochastic differential equations (SDEs), numerical integration schemes, and numerical linear algebra algorithms for modeling and simulation of biomolecules and liquids.
- Analysis of terabyte-sized, very-high-dimensional molecular simulation data using Markov State Models (MSMs), network models, and statistical mechanics.
- HMM-based classifiers and pipelines for annotating genes in insect genomes.
- Bayesian models and Markov Chain Monte Carlo algorithms for insect population genetics.
- Nature-inspired approximation algorithms for combinatorial optimization problems.
- Math model for predicting performance bottlenecks in Folding@Work, framework for running thousands of molecular dynamics simulations in parallel.

Selected Open Source Contributions

- Apache Spark – (Scala, Python) Improvements to machine learning algorithms, data generators, tests, and documentation. http://spark.apache.org/
- Apache BigTop – (Java, Scala) Contributor and maintainer of BigPetStore and BigTop Bazaar data generators and associated example analytics applications. http://bigtop.apache.org/
- ProtoMol – (C++) Implemented numerical algorithms for molecular dynamics simulations. http://sourceforge.net/projects/protomol/

Selected Software Engineering Projects

- CONNJUR Spectrum Translator – (Java) Designed and implemented universal file format converter for Nuclear Magnetic Resonance data. http://connjur.uchc.edu/downloads/st/

- CONNJUR Workflow Builder – (Java) Integrated command-line tools with database-driven, visual-programming environment for Nuclear Magnetic Resonance data processing. http://connjur.uchc.edu/downloads/wb/
- MIMOSA – (Java) Information management system for annotation of short amino-acid sequences from papers. http://www.bio-toolkit.com/MimoSA/project/
- Solar System Simulator – (Python) Plugin-based framework for simulating solar bodies by numerically integrating Newton's equations of motion. (Available upon request.)

Publications

* denotes equal contribution

RJ Nowling and J Vyas. "A domain-driven, generative data model for BigPetStore." *Proceedings of the 4th IEEE International Conference on Big Data and Cloud Computing*, 2014.

JC Sweet, **RJ Nowling**, TM Cickovski, CR Sweet, VS Pande, and JA Izaguirre. "Long Timestep Molecular Dynamics on the Graphical Processing Unit." *J. Chem. Theory Comput.,* 9(8):3267–3281, 2013.

RJ Nowling*, JL Abrudan*, DA Shoue, B Abdul-Wahid, M Wadsworth, G Stayback, FH Collins, MA McDowell, and JA Izaguirre. "Identification of Novel Arthropod Vector GPCRs." *Parasit. Vectors*, 6:150, 2013.

HJC Ellis, G Weatherby, **RJ Nowling**, J Vyas, M Fenwick, and MR Gryk. "A Software Architecture for NMR Spectral Data Translation." *CISE*, 15(1):76-83, 2013.

RJ Nowling and TM Cickovski. "Prototype to Release: Software Engineering for Scientific Software." *Biomedical Computation Review*, Fall 2012.

RJ Nowling, J Vyas, G Weatherby, MW Fenwick, HJC Ellis, and MR Gryk. "CONNJUR Spectrum Translator: An open-source application for reformatting NMR spectral data." *J Bio NMR*, 50:83-89, 2011.

RJ Nowling and H Mauch. "Priority Encoding Scheme for Solving Permutation and Constraint Problems with Genetic Algorithms and Simulated Annealing." *Proceedings of the 8th International Conference on Information Technology - New Generations*, 2011.

HJC Ellis, J Vyas, **RJ Nowling**, TO Martyn and MR Gryk. "Iterative Development Of An Application To Support Nuclear Magnetic Resonance Data Analysis Of Proteins." *Proceedings of the 8th International Conference on Information Technology - New Generations*, 2011.

J Vyas*, **RJ Nowling***, T Meusberger, D Sargeant, K Kadaveru, MR Gryk, V Kundeti, S Rajasekaran, and MR Schiller. "MimoSA: a system for minimotif annotation." *BMC Bioinformatics*, 11:328, 2010.

J Vyas, **RJ Nowling**, MW Maciejewski, S Rajasekaran, MR Gryk, and MR Schiller. "A proposed syntaxfor Minimotif Semantics, version 1." *BMC Genomics*, 10:360, 2009.

Poster Presentations

RJ Nowling. BigTop Bazaar: Simulating Customer Dynamics Driven By Booth Preferences at a Conference. Poster Presented at the 2015 Annual Conference of the Great Lakes Section of the Society for Industrial and Applied Math (2015), Grand Rapids, MI.

RJ Nowling, M Wadsworth, JL Abrudan, DA Shoue, B Abdul-Wahid, GM Stayback, FH Collins, MA McDowell, and JA Izaguirre. Identifying GPCRs in the Genome of the Sand Fly *P. papatasi* using Ensemble*. Poster Presentation at the 7th Annual Arthropod Genomics Symposium (AGS, 2013), Notre Dame, IN.

RJ Nowling, CR Sweet, and JA Izaguirre. Extending Long Timestep Molecular Dynamics (LTMD) to Explicit Solvent. Poster Presentation at the Midwest Theoretical Chemistry Conference (MWTCC, 2013), Urbana-Champaign, IL.

RJ Nowling, JL Abrudan, DA Shoue, B Abdul-Wahid, M Wadsworth, GM Staybak, FH Collins, MA McDowell, and JA Izaguirre. Evaluation and Development of GPCR Classifiers for Vectors. Poster Presentation at the Second Annual Eck Institute for Global Health Research Retreat (2013, Notre Dame, IN.