

## Employment

### Software Developer

**August 2013 – Present***Signal (formerly known as BrightTag)**Chicago, IL*

- Develop data models and analytics algorithms to classify, merge, and analyze user profile data networks for millions of requests per day; distributed in NoSQL database with billions of records (~30 TB) [Java, Cassandra, Python, R]
- Research and implement scalable solutions for a hybrid real-time/batch data pipeline to evaluate user segmentation; experimenting with Hadoop, Spark, Kafka, and Scala
- Created real-time anomaly detection and network traffic forecasting system using Fourier analysis capable of predicting regular traffic patterns for upcoming week with >90% accuracy [Java, Python, SciPy, NumPy, MongoDB]
- Built client data reporting web app to display inter-client clustering (via principal component analysis) and user interaction frequency trends (via kinetics modeling) [Python, Flask, SciPy, JavaScript, D3.js, Cassandra]

### Postdoctoral Appointee

**March 2012 – August 2013***Argonne National Laboratory Leadership Computing Facility / University of Chicago**Chicago, IL*

- Optimized and developed massively parallel physics/chemistry simulations on IBM Blue Gene/Q supercomputer; increased simulation speed more than 8x, scalability to ~0.4 million CPU cores [C/C++, MPI, OpenMP, Python]
- Devised novel quantum mechanical proton transport model; developed implementation via numerical/statistical optimization techniques (simulated annealing, linear regression, swarm intelligence)

### Ph.D. Student Researcher

**June 2007 – March 2012***The Ohio State University**Columbus, OH*

- Published 10 first author journal articles; presented at 20+ professional and academic events
- Invented physical model for screened solvent electrostatics, geometrical algorithm for constructing molecule surfaces, stochastic optimization (genetic algorithm) for load balancing numerical integrals; applications involving singular value decomposition of excited electronic quantum states in DNA

## Education

### Ph.D. Computational/Physical Chemistry

**June 2007 – March 2012***The Ohio State University**Columbus, OH*

Dissertation: "Multi-layer Methods for Quantum Chemistry in the Condensed Phase: Combining Density Functional Theory, Molecular Mechanics, and Continuum Solvation Models" ([view PDF](#))

### B.S. Chemistry, minor Microbiology

**August 2003 – June 2007***The Ohio State University**Columbus, OH*

*Formal Coursework:*

Quantum Mechanics, Statistical Thermodynamics, Chemical Physics, Computational Chemistry, Computer Programming  
Multivariable Calculus, Linear Algebra, Differential Equations, Numerical Methods

*Supplementary Online Coursework:*

Udacity: Web Development, Programming Languages, Parallel Programming (GPU, CUDA), Machine Learning  
Coursera: Data Science Signature Track (R, Statistics, Data Wrangling), Machine Learning, Algorithms, Databases

## Technical Skills

| Experience | Languages   | Tools/Technologies  |
|------------|---|---|
| Proficient | Java, Python, C/C++, Unix/Linux shell (bash), awk | NoSQL (Cassandra), git, vim, L <sup>A</sup> T <sub>E</sub> X, MPI, OpenMP |
| Familiar   | R, HTML, CSS, JavaScript (Node.js), Fortran       | SQL (MySQL), Redis, Flask, SciPy, Guava, Guice                            |

## Projects & Additional Experience

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View code for my projects below on my GitHub page: [github.com/awlange](https://github.com/awlange)

- **MathWorkersJS** (2014 – Present): Open-source parallel JavaScript math and statistics library built around HTML5 Web Workers and Node.js cluster library capable of speeding up computations on multi-core devices; accompanying documentation website: [mathworkersjs.org](https://mathworkersjs.org) [JavaScript/Node.js, HTML, CSS/SCSS, Python, Flask, Apache Server]
- **Smart Alerts** (2014 – Present): Determine if an automated server alert requires manual intervention; comparing implementations as decision tree versus neural network [Python]
- **PiPlayer** (2014): Flask web app for streaming music from external hard drive at home, connected through a RaspberryPi computer [Python, Flask, JavaScript/jQuery/AJAX, HTML, CSS]
- **Personal Website** (2013 – Present): [adrianlange.com](https://adrianlange.com); Back-end to front-end from scratch; dynamic content blog [HTML, CSS/SCSS, JavaScript/jQuery/Node.js/AJAX, MySQL]
- **Project Euler** (2013 – Present): Recreational mathematics and programming problems from [projecteuler.net](https://projecteuler.net); currently solved [over 100 problems](#), 98th percentile [C++, Python]
- **FMO-MS-RMD** (2013): Parallel interface to Q-Chem program for propagating chemically reactive proton transport simulations with analytic gradients; demonstrated scalability to >200 CPUs [C++, C, MPI]

## Open-Source & Community Contributions

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- **Cassandra Python Driver** (2014): Simple error handling for input server connection list [Python]
- **KairosDB** (2014): User configurable regular expression for database keys [Java]
- **Q-Chem** (2007 – 2014): Lead author of PCM solvation, QM/MM, parallel linear algebra solvers, and Fast Multipole Method code; software design committee; 7th author of 161 co-authors on [software white paper](#) [C/C++, Fortran]
- **LAMMPS** (2013): Optimized compute kernel for pairwise interactions; multi-dimensional communication interface for use in ensemble statistical mechanics simulations ([LAMMPS Ensembles](#)) [C++, MPI, OpenMP]

## Selected Publications

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4 of 14 total publications; 12 first author papers, 380+ citations, h-index 8 (see [Google Scholar Citations](#))

- **Adrian W. Lange** and Gregory A. Voth. "Multi-state Approach to Chemical Reactivity in Fragment Based Quantum Chemistry Calculations." *J. Chem. Theory Comput.* 9, 4018-4025 (2013). ([view PDF](#))
- **Adrian W. Lange** and John M. Herbert. "A Simple Polarizable Continuum Solvation Model for Electrolyte Solutions." *J. Chem. Phys.* 134, 204110 (2011). ([view PDF](#))
- **Adrian W. Lange** and John M. Herbert. "Symmetric Versus Asymmetric Discretization of the Integral Equations in Polarizable Continuum Solvation Models." *Chem. Phys. Lett.* 509, 77 (2011). ([view PDF](#))
- **Adrian W. Lange** and John M. Herbert. "Both Intra- and Interstrand Charge-Transfer Excited States in Aqueous B-DNA Are Present at Energies Comparable to or Just Above the  $^1\pi\pi^*$  Excitonic Bright States." *J. Am. Chem. Soc.* 131, 3913-3922 (2009). ([view PDF](#))

## Honors & Awards

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|---|------|
| • Chair's Prime Choice in Computational Division at American Chemical Society Conference      | 2013 |
| • Presidential Fellowship from The Ohio State University Graduate School (\$33,150)           | 2012 |
| • Chemical Computing Group Research Excellence Award from American Chemical Society (\$1,150) | 2012 |
| • Travel Fellowship to present at American Conference on Theoretical Chemistry (\$600)        | 2011 |
| • Selected to attend Telluride School on Theoretical Chemistry (\$850)                        | 2011 |
| • U.S. Department of Energy Merit Scholarship for top poster presentation (\$400)             | 2010 |
| • 3rd place (out of ~30) at Ohio State University Denman Undergraduate Research Forum (\$300) | 2006 |
| • American Society for Microbiology Undergraduate Research Fellowship (\$4,000)               | 2006 |
| • Ohio State Arts & Sciences Undergraduate Honors Research Scholarship (\$3,500)              | 2006 |