

# Aaron Vose

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## Machine Learning / Software Engineer

Talented software engineer possessing comprehensive experience developing and optimizing software for production in high-performance computing environments such as the Titan and Kraken supercomputers. Also possesses in-depth experience using machine learning to solve real-world science and industry problems at scale. Project lead for multiple machine learning research efforts with deep neural networks and genetic algorithms which resulted in successful publication and formation of new product offerings.

## Work Experience



### NanoSemi Inc., a MaxLinear Company

Principal Machine Learning Engineer,  
February 2020 – present.



- Create optimized implementations of computational kernels for neural network algorithms.
- Create customer-facing product demo software utilizing OpenGL, TCP/IP, and an FPGA.



### Cray Inc., a Hewlett Packard Enterprise Company

Software Engineer and Machine Learning Engineer,  
July 2013 – January 2020.



- Assist scientists optimize code on world-class HPC systems like the Titan supercomputer.
- Research and development in ML / DL, specializing in NN hyperparameter optimization.
- Create novel genetic algorithm for neural network optimization as core of new products.
- Research and engineering for FastForward2, DesignForward2, and PathForward projects with U.S. Department of Energy under the umbrella of the Exascale Computing Project.



### Joint and National Institutes for Computational Science (JICS / NICS)

Research Associate and Intern,  
May 2010 – January 2012.



- Write HPC application optimization framework for input / output and job scheduling.
- Scale bioinformatics software such as the molecular docking package Dock6 and NCBI's BLAST and PSI-BLAST software to thousands of nodes on the Kraken supercomputer.



### University of Tennessee

Research Assistant, Graduate Teaching Assistant, and STARS Alliance Mentor,  
August 2002 – July 2013.

- Complete numerous research projects, many of which result in peer-reviewed publication.
- Research focus in the areas of ecology and evolutionary biology as well as bioinformatics.
- Assist teaching the courses “Databases & Scripting Languages” and “Operating Systems.”
- Provide students instruction as well as perform evaluation of all lab work for the courses.

## Academic History



M.S., Computer Science, Summer 2013.

B.S., Computer Science, Spring 2010.

University of Tennessee, Knoxville.

*Cum Laude*



CCDA - Cisco Certified Design Associate, 2001.

CCNA - Cisco Certified Network Associate, 2000.

## Highlighted Skills

C / C++, Python (NumPy, SciPy, Pandas, Dask, Matplotlib, RDKit), SQL, Fortran, Bash, Java.  
Neural Networks (TensorFlow, Keras, Sonnet): Convolutional, Dense, Recurrent, Graph, Hopfield.  
L<sup>A</sup>T<sub>E</sub>X, GCC / GDB, POSIX, PThreads, OpenMP, OpenACC, CUDA, MPI, OpenGL, WebGL.

## Books

John Levesque and Aaron Vose, (2017) “Programming for Hybrid Multi/Manycore MPP Systems”. *Chapman and Hall / CRC. Computational Science Series*, ISBN 9781439873717, Taylor & Francis.

## Journal, Conference, Chapter, and Other Publications

Patrick Lavin, Jeffrey Young, Richard Vuduc, Jason Riedy, Aaron Vose, and Daniel Ernst (2020) “Evaluating Gather and Scatter Performance on CPUs and GPUs”. *The International Symposium on Memory Systems (MEMSYS 2020), Washington, DC, USA*. ACM, New York, NY, USA.

Aaron D. Vose, Jacob Balma, Damon Farnsworth, Kaylie Anderson, and Yuri K. Peterson (2019) “PharML.Bind: Pharmacologic Machine Learning for Protein-Ligand Interactions”. *arXiv.org* 1911.06105

Aaron Vose, Jacob Balma, Alex Heye, Alessandro Rigazzi, Charles Siegel, Diana Moise, Benjamin Robbins, and Rangan Sukumar (2019) “Recombination of Artificial Neural Networks”. *arXiv.org* 1901.03900

Steve Farrell, Aaron Vose, Oliver Evans, Matthew Henderson, Shreyas Cholia, Fernando Perez, Wahid Bhimji, Shane Canon, Rollin Thomas, and Prabhat (2018) “Interactive Distributed Deep Learning with Jupyter Notebooks”. *International Conference on High Performance Computing* (pp. 678-687) Springer, Cham.

Otten, M., Gong, J., Mametjanov, A., Vose, A., Levesque, J., Fischer, P. and Min, M. (2016) “An MPI/OpenACC implementation of a high-order electromagnetics solver with GPUDirect communication”. *International Journal of High Performance Computing Applications*.

Kjaergaard, T., Baudin, P., Bykov, D., Eriksen, J.J., Ettenhuber, P., Kristensen, K., Larkin, J., Liakh, D., Pawlowski, F., Vose, A., and Wang, Y.M. (2016) “Massively parallel and linear-scaling algorithm for second-order Moller-Plesset perturbation theory applied to the study of supramolecular wires”. *Computer Physics Communications*.

M. Norman, J. Larkin, A. Vose, and K. Evans (2015) “A case study of CUDA FORTRAN and OpenACC for an atmospheric climate kernel”. *Journal of Computational Science*. Vol 9: 1-6.

A. Vose, B. Mitchell, J. Levesque (2014) “Tri-Hybrid Computational Fluid Dynamics on DoE’s Cray XK7, Titan”. 2014 *Cray User Group* (CUG).

Birand, A., A. Vose, and S. Gavrillets (2012) “Patterns of species ranges, speciation, and extinction”. *American Naturalist*. Vol 179.

B. Rekepalli, A. Vose, and P. Giblock (2012) “HSPp-BLAST: Highly Scalable Parallel PSI-BLAST for Very Large-scale Sequence Searches”. *Bioinformatics and Computational Biology (BICoB-2012), ISCA 4th Int’l. Conference 2012, Las Vegas, Nevada*.

L. D. Crosby, R. G. Brook, B. Rekepalli, M. Sekachev, A. Vose, and K. Wong (2011) “A Pragmatic Approach to Improving the Large-scale Parallel I/O Performance of Scientific Applications”. 2011 *Cray User Group* (CUG).

E. A. Duenez-Guzman, A. D. Vose, M. D. Vose, and S. Gavrillets (2009) “Simulating Population Genetics on the XT5”. 2009 *Cray User Group* (CUG).

Gavrillets, S. and A. Vose (2009) “Dynamic patterns of adaptive radiation: evolution of mating preferences”. In Butlin, RK, J Bridle, and D Schluter (eds) *Speciation and Patterns of Diversity*, Cambridge University Press, pp. 102-126.

Gavrillets, S. and A. Vose (2007) “Case studies and mathematical models of ecological speciation. 2. Palms on an oceanic island”. *Molecular Ecology* 16: 2910-2921

Gavrillets, S., A. Vose, M. Barluenga, W. Salzburger, and A. Meyer (2007) “Case studies and mathematical models of ecological speciation. 1. Cichlids in a crater lake”. *Molecular Ecology* 16: 2893-2909

Gavrillets, S. and A. Vose (2006) “The dynamics of Machiavellian intelligence”. *Proceedings of the National Academy of Sciences USA* 103: 16823-16828

Gavrillets, S. and A. Vose (2005) “Dynamic patterns of adaptive radiation”. *Proceedings of the National Academy of Sciences USA* 102: 18040-18045

## Presentations

Vose, A. “Breeding Artificial Brains on Supercomputers”, *Maryland HPC User Group*, College Park, Maryland, 2019.

Vose, A. “Porting Computational Physics Applications to the Titan Supercomputer with OpenACC and OpenMP”, *GPU Technology Conference* (GTC), San Jose, California, 2015.

Rekepalli, B.; Vose, A. “Petascale Genomic Sequence Search.” *Proceedings of The 11th IEEE/ACM International Symposium on Cluster, Cloud, and Grid Computing*, Newport Beach, California, May 2011.

Vose, A. “Modeling Speciation in Anolis Lizards”, *South Eastern Population Ecology and Evolutionary Genetics Conference* (SEPEEG), Cades Cove, Tennessee, 2007.