Dr. John C. Linford

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312 Orley Rd.
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EDUCATION

Ph.D. in Computer Science — May 2010
Virginia Polytechnic Institute and State University, Blacksburg, Virginia USA
Dissertation Title: Accelerating Atmospheric Modeling Through Emerging Multi-core Technologies
GPA: 3.76/4.0, **Outstanding Doctoral Dissertation Award**

B.S. in Computer Science — May 2005
Weber State University, Ogden, Utah USA
GPA: 3.99/4.0, Mathematics Minor, **Scholar of the Year**

EXPERIENCE

Senior Computer Scientist — July 2011 – Present
ParaTools, Inc., Eugene, Oregon USA

- Envisioned, proposed, and **won seven SBIR projects (+$2.5M)** from NASA, DOE, and DOD. Performed the majority of all technical work, commercialization, marketing, and technical support for all projects.
- Led a distributed team of mathematicians, computer scientists, biologists, physicists, and aerospace engineers in implementing tools for **aerospace engineering**, **chemical kinetics**, and **software performance engineering**.
- Implemented numerous client-specific solutions comprising over 50% of our annual revenue, e.g. supported the DOD CREATE-AV program with **custom Python packages for IBM, Cray, SGI, and Dell supercomputers**.
- Contributed memory profiling, fault-isolating callstack debugging, NVIDIA CUDA and the Intel Xeon Phi support, MinGW cross-compiler support, and performance improvements to the TAU Performance System.
- Created and presented training materials, lectures, and tutorials to clients worldwide. Developed best-practices guides and conducted training events to support DOD's High Performance Computing Modernization Program.

Real-Time Software Engineer — May 2009 – July 2011
Northrop Grumman Electronic Systems, Linthicum, Maryland USA

- Implemented **synthetic aperture radar (SAR)** kernels in C++ on Cell Broadband Engine-based CPUs.
- **Improved math kernel performance by 100x** through performance analysis and parallelization.
- Applied dynamic binary rewriting to patch assembly-level concurrency bugs in closed-source software.

Software Engineering Intern — March 2007 – May 2009
Avid Aerospace LLC, Blacksburg, Virginia USA

- **Achieved 20x speedup in FUN3D** and other CFD codes running on a turnkey Linux cluster.
- Designed and implemented multi-core/distributed memory particle swarm optimization (PSO) in C++.

Guest Researcher — Summer 2007 and Summer 2008
Jülich Supercomputing Centre, Jülich Germany

- Contributed to **Scalasca**, the open source parallel performance analysis toolset.
- Analyzed weather model performance on **IBM BlueGene/L and /P** and **IBM BladeCenter QS22** installations.
- Improved post-mortem deadlock detection and prevention in applications with thousands of threads.

PROJECTS

TAU Commander — www.taucommander.com/git
A Performance Engineering Workflow Manager for the TAU Performance System
TAU Commander is a systemized workflow manager that guides users through performance engineering tasks and offers constructive feedback in case of error. Since its launch in late 2016, it has measurably improved productivity and software performance in mission-critical government and industry applications.

Kppa: The Kinetic PreProcessor Accelerated — www.paratools.com/kppa
A Chemical Kinetics Code Generator and General Analysis Tool
Kppa generates C, CUDA, or Fortran source code that simulates the evolution of chemical species over time. Kppa-generated codes can achieve 20-40x the performance of state-of-the-art codes used in combustion and earth science models. It supports the Intel Xeon Phi, NIVIDA GPUs, and multi-core CPUs.

ParaTools ThreadSpotter — www.paratools.com/threadspotter
Multi-threaded Cache Optimization
ThreadSpotter automatically analyzes application performance, rates performance problems, suggests fixes, and provides insights and statistics to quickly assess and resolve inefficient cache use. ParaTools ThreadSpotter expands these capabilities to support multi-language distributed memory applications and integrates with the TAU Performance System to analyze data movement across the memory hierarchy on each compute node.

SKILLS	- Expert programmer of all well-known languages and computing paradigms including **C/C++, Fortran, Python, OpenMP, MPI, SHMEM, CUDA, OpenACC, OpenCL**, and other lesser-known technologies. - Deep understanding of computing platforms ranging from **leadership-class supercomputers to embedded systems** comprised of x86 or PowerPC architectures, POSIX operating systems, macOS, or Windows. - Excellent command of software carpentry practices including version control, test-driven development, extreme programming, profiling, and regression testing with tools such as **Gitlab, Jenkins, Travis, and Codecov**. - Excellent writing and public speaking skills with nearly two decades of teaching and tutoring experience. - Familiar with sensitive materials and environments. Inactive TS/SCI clearance.

SELECT PUBLICATIONS	J.C. Linford, S. Vadlamani, S. Shende, A.D. Malony, W. Jones, W.K. Anderson, and E. Nielsen. "Performance Engineering FUN3D at Scale with TAU Commander." Poster Session. *ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC'16)*. 2016.
	J.C. Linford, T.A. Simon, S. Shende and A.D. Malony. "Intuitive Performance Engineering at the Exascale with TAU and TAU Commander." 3rd Extreme-Scale Programming Tools Workshop. *ACM/IEEE International Conference for High Performance Computing, Networking, Storage and Analysis (SC'14)*. 2014.
	J.C. Linford, T.A. Simon, S. Shende and A.D. Malony. "Profiling Non-Numeric OpenSHMEM Applications with the TAU Performance System." *LNCS: Special Issue on OpenSHMEM*. Volume 8356, 2014, pp 105-119.
	J.C. Linford, S. Shende, A.D. Malony, A. Wissink, and S. Adamec. "Efficient Parallel Runtime Bounds Checking with the TAU Performance System." *Proceedings of the 2013 IEEE High Performance Extreme Computing Conference (HPEC'13)*. Waltham, MA. Sept 10-12, 2013.
	J.C. Linford, S. Shende, A.D. Malony, A. Wissink, and S. Adamec. "Isolating Runtime Faults with Callstack Debugging using TAU." *Proceedings of the 2012 IEEE High Performance Extreme Computing Conference (HPEC'12)*. Waltham, MA. Sept 10-12, 2012.
	J.C. Linford, J. Michalakes, M. Vachharijani, and A. Sandu. "Automatic Generation of Multi-core Chemical Kernels." *IEEE Transactions on Parallel and Distributed Systems (TPDS)*. Volume 22(1). 2011. pp 119-131.
	J.C. Linford and A. Sandu. "Scalable Heterogeneous Parallelism for Atmospheric Modeling and Simulation." *Journal of Supercomputing*. Volume 56(3). 2011. pp 300-327.
	J.C. Linford, J. Michalakes, M. Vachharijani, and A. Sandu. "Multi-core Acceleration of Chemical Kinetics for Modeling and Simulation." *Proceedings of the 2009 ACM/IEEE Supercomputing Conference (SC'09)*. Portland, OR. Nov 14-20, 2009.
	J.C. Linford and A. Sandu. Chemical Kinetics on Multi-core SIMD Architectures. *Proceedings of the 2009 International Conference on Computational Science (ICCS'09)*. Baton Rouge, LU. May 25-29, 2009.

INVOLVEMENT	**Technical Program Committee Member**	SC'16, SC'17
	International Conference for High Performance Computing, Networking, Storage and Analysis *Performance Technical Track*	
	Technical Program Committee Member	SC'14 – SC'17
	International Conference for High Performance Computing, Networking, Storage and Analysis *Workshop for HPC User Support Tools (HUST)*	
	NSF High Performance Computing REU Sponsor	2015
	University of Maryland Baltimore County and ParaTools, Inc.	
	Technical Program Committee Member	2011, 2012
	Symposium on Application Accelerators for High Performance Computing	

AWARDS	**Northrop Grumman Cync Program Scholarship**	2015 – 2017
	Northrop Grumman and the Cyber Incubator@bwtech	
	Northrop Grumman Performance Award	2011
	Northrop Grumman Electronic Systems	
	National Defense Science and Engineering Graduate Fellowship (4% acceptance rate)	2007 – 2010
	American Society for Engineering Education	
	Central European Summer Research Institute Graduate Fellowship	2007
	Institute for International Education	