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# Theron Voran

## Research Statement

My research is focused on enabling scientific applications to make efficient use of cloud systems, including methods and tools for performance analysis in virtualized environments.

## Education

(in progress) **PhD Computer Science**, *University of Colorado Boulder*, Boulder, CO.

2006 **MS Computer Science**, *University of Colorado Boulder*, Boulder, CO.

2003 **BS Computer Science**, *Illinois Institute of Technology*, Chicago, IL, *with High Honors*.

## Teaching Experience

Teaching Asst. *High Performance Scientific Computing*, University of Colorado Boulder, Spring 2006, Fall 2007, Fall 2008, Fall 2012.

Tutorial *S11: Linux Cluster Construction*, presented at SC'10, New Orleans, LA, November 2010.

Tutorial *M06: Linux Cluster Construction*, presented at SC'09, Portland, OR, November 2009.

Tutorial *Quick Start Linux Cluster Construction*, presented at LCI 2009, Boulder, CO, March 2009.

## Research Positions

Spring 2004 - Present **Research Assistant**, *Henry Tufo*, University of Colorado Boulder.
Exploration and performance analysis of new high-performance computing (HPC) technologies. Using Docker containers for performance management in a computational workflow manager. Porting scientific models to various HPC architectures (Blue Gene, Intel MIC). Tuning math kernels with Blue Gene SIMD instructions. System administration and software development for the Computational Science Center clusters.

Summer 2013 **Givens Associate**, *MCS Division*, Argonne National Laboratory.
Givens Associates program for graduate students, worked for Narayan Desai and the Magellan team on examining virtualization performance issues with OpenStack and KVM. Explored ideas for integrating performance management into a computational workflow manager (AWE).

Summer 2012 **XSEDE Intern**, *Texas Advanced Computing Center (TACC)*, UT Austin.
Porting and optimizing spectral element-based Fortran codes (HOMME, nek5000) on the Intel MIC architecture in preparation for the incoming Stampede system at TACC.

Fall 2004 - Summer 2012 **Student Assistant/Visitor**, *Computer Science Section*, National Center for Atmospheric Research.
Testing and evaluating emerging HPC architectures, including Blue Gene and Intel MIC. Developed automated testing suite for HOMME, using Python and XML. Developed a resource manager and scheduler for Blue Gene (Cobalt). System administration and user support for Blue Gene.

Summers 2004, 2008 **Intern**, *IBM Research*, T.J. Watson Laboratory.
Porting and tuning NCAR's climate model HOMME to the Blue Gene/L platform, under guidance of Gyan Bhanot and Bob Walkup. Worked with Jim Sexton on experiments with the DMA layer of the Blue Gene/P torus interconnect.

Summers 2006, 2007 **Givens Associate**, *MCS Division*, Argonne National Laboratory.
Givens Associates program for graduate students, worked under direction of Narayan Desai. Designed and implemented advanced queuing and scheduling abilities in Cobalt, a resource manager and scheduler for Blue Gene/L systems. Developed component to interface with BG/L system software.

Fall 2003 **DOE/SULI Intern**, *MCS Division*, Argonne National Laboratory.
Internship program at Argonne in the Laboratory for Advanced Numerical Software Group (LANS) with Rajeev Thakur and Rob Ross. Used FOBS protocol (alternative to TCP) to add fast remote read/write capability to ROMIO, Argonne's implementation of MPI-I/O.

## Professional Service

IMUDI 2012 Member of program committee for the Special Session on Improving MPI User And Developer Interaction at EuroMPI 2012. http://press.mcs.anl.gov/imudi/imudi2012/

LCI 2008, 2009 Assisted program committee for LCI International Conference on Linux Clusters. Organized submission site for conference, shepherded publications through review process, created proceedings handouts, etc.

## Software

Cobalt Contributor to Cobalt, the Component-based Lightweight Toolkit. A resource manager and scheduler primarily used on Blue Gene systems. http://trac.mcs.anl.gov/projects/cobalt/

## Journal Publications

Michael Oberg, Matthew Woitaszek, Theron Voran, and Henry M. Tufo. A system architecture supporting high-performance and cloud computing in an academic consortium environment. *Computer Science - Research and Development*, 26:317–324, 2011.

G. Bhanot, J. M. Dennis, J. Edwards, W. Grabowski, M. Gupta, K. Jordan, R. D. Loft, J. Sexton, A. St-Cyr, S. J. Thomas, H. M. Tufo, T. Voran, R. Walkup, and A. A. Wyszogrodski. Early experiences with the 360TF IBM Blue Gene/L platform. *International Journal of Computational Methods (IJCM)*, 5(2):237–253, 2008.

## Conference and Workshop Publications

Theron Voran, Jose Garcia, and Henry Tufo. Evaluating intel's many integrated core architecture for climate science. In *TACC-Intel Highly Parallel Computing Symposium (TI-HPCS)*, April 2012.

P. Marshall, M. Oberg, N. Rini, T. Voran, and M. Woitaszek. Virtual clusters for hands-on linux cluster construction education. In *Proceedings of the 11th LCI International Conference on High-Performance Clustered Computing*, March 2010.

J. Garcia, R. Kelly, and T. Voran. Computing spectropolarimetric signals on accelerator hardware: Comparing the cell be and nvidia gpus. In *Proceedings of the 10th LCI International Conference on High-Performance Clustered Computing*, March 2009.

N. Desai, E. Lusk, D. Buettner, A. Cherry, and T. Voran. Simulating failures on large-scale systems. In *ICPPW '08: Proceedings of the 2008 International Conference on Parallel Processing - Workshops*, pages 103–108, Washington, DC, USA, Sept. 2008. IEEE Computer Society.

N. Desai, T. Voran, E. Lusk, and A. Cherry. The computer as software component: A

mechanism for developing and testing resource management software. In *Cluster Computing, 2007 IEEE International Conference on*, pages 58–63, Sept. 2007.

J. Cope, M. Oberg, H.M. Tufo, T. Voran, and M. Woitaszek. High throughput grid computing with an IBM Blue Gene/L. In *Proceedings of the 9th IEEE International Conference on Cluster Computing (CLUSTER07)*, pages 357–364, 2007.

J. Cope, T. Voran, M. Woitaszek, A. Boggs, S. McCreary, M. Oberg, and H.M. Tufo. Experiences deploying a 10 gigabit ethernet computing environment to support regional computational science. In *Proceedings of the 8th LCI International Conference on High-Performance Clustered Computing*, 2007.

A. Boggs, J. Cope, S. McCreary, M. Oberg, H.M. Tufo, T. Voran, and M. Woitaszek. Improving cluster management with scalable filesystems. In *Proceedings of the 7th LCI International Conference on Linux Clusters: The HPC Revolution*, 2006.

M. Oberg, H.M. Tufo, T. Voran, and M. Woitaszek. Evaluation of rdma over ethernet technology for building cost effective linux clusters. In *Proceedings of the 7th LCI International Conference on Linux Clusters: The HPC Revolution*, 2006.

G. Almasi, G. Bhanot, D. Chen, M. Eleftheriou, B. Fitch, A. Gara, R. Germain, J. Gunnels, M. Gupta, P. Heidelberg, M. Pitman, A. Rayshubskiy, J. Sexton, F. Suits, P. Vranas, B. Walkup, C. Ward, Y. Zhestkov, A. Curioni, W. Andreoni, C. Archer, J. Moreira, R. Loft, H. Tufo, T. Voran, and K. Riley. Early experience with scientific applications on the Blue Gene/L supercomputer. In *Euro-Par 2005 Parallel Processing*, pages 560–570, August 2005.

J.M. Dennis, M. Levy, R.D. Nair, H.M. Tufo, and T. Voran. Towards an efficient and scalable discontinuous galerkin atmospheric model. In *Proceedings of the 19th IEEE International Parallel and Distributed Processing Symposium*, volume 14, page 257a, April 2005.