Todd Gamblin

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Education

2009 **Ph.D., Computer Science**, *University of North Carolina at Chapel Hill*.
Scalable Performance Measurement and Analysis. Advisor: Daniel A. Reed.

2005 **M.S., Computer Science**, *University of North Carolina at Chapel Hill*.

2002 **B.A., Computer Science & Japanese**, *Williams College*.

Awards & Honors

2015 LLNL Director's Institutional Operational Excellence (DIOE) Award for labwide collaboration tools.

2015 LLNL award for organizing & reinvigorating the JOWOG 34 Applied CS workshop.

2014 U.S. Department of Energy (DOE) Early Career Research Award.

2014 Best Paper, International Symposium on Cluster, Cloud and Grid Computing (CCGrid).

2013 Best Paper, International Conference on Supercomputing (ICS).

2013 Invited to LLNL Computation Leadership Program.

2012, 2013 Two LLNL awards for building collaborative development tools for all supercomputer users.

2011 LLNL award for leadership on the PAVE project.

2010 LLNL achievement award for the Scalable Application Preparation project.

2010 Best Poster, LLNL Computation Postdoc Poster Competition.

2006-2008 Latané Interdisciplinary Fellowship.

2007 Member, Frank Porter Graham Honor Society.

2006 Best Poster, Los Alamos Computer Science Institute (LACSI) Symposium.

2004 NSF East Asia and Pacific Summer Institutes (EAPSI) Fellowship.

2001 Williams College Linen Grant for summer research in Asia.

Research Experience

2010-present **Lawrence Livermore National Laboratory**, *Computer Scientist*.
Developing techniques and tools to measure, store, and analyze performance data from parallel applications with million-way concurrency. Automatically diagnosing data-dependent problems using machine learning.

2009-2010 **Lawrence Livermore National Laboratory**, *Postdoctoral Scholar*.
Developed $O(log(P))$ parallel clustering algorithm for on-line performance analysis.

2008-2009 **Lawrence Livermore National Laboratory**, *Research Intern*.
Jun, Aug 2007 Developed scalable parallel load balance measurement tools using wavelet compression.

2004-2008 **Renaissance Computing Institute (RENCI)**, **UNC Chapel Hill**, *Research Assistant*.
Researched statistical and numerical techniques for performance measurement data reduction.

Summer 2006 **IBM Thomas J. Watson Research Center**, *Research Intern*.
Developed distributed clock synchronization for virtualized environments on IBM System z mainframes.

Summer 2004 **Nanya-Nakamura Laboratory**, **University of Tokyo**, *Research Intern*.
On NSF EAPSI fellowship, investigated low-power register design using asynchronous digital logic.

2003-2004 **Clockless Computing Laboratory**, **UNC Chapel Hill**, *Research Assistant*.
Investigated modular interface designs for asynchronous (clockless) digital circuits.

2001-2002 **Williams College**, *Undergraduate Research Assistant*.
Investigated cache-conscious memory performance optimizations.

Professional Experience

2002-2003	**ValueCommerce, Co., Ltd.**, *Software Developer*, Tokyo, Japan.
	Developed control panel for web hosting application; conducted performance analysis for ad servers.
Summer 2001	**EMC Corporation**, *Summer Intern*, Research Triangle Park, NC.
Summer 2000	Developed distributed performance monitoring tools and web-based user interface for NAS servers.

Research Funding

2014-2019	**PI**, *Statistical Methods for Exascale Performance Modeling*, $2,500,000.
	U.S. Department of Energy (DOE) Early Career Research Program.
2010-present	**PI**, *Performance Analysis and Visualization at Exascale (PAVE)*, $500,000/year.
	Proposed as Lab Directed Research and Development (LDRD), funded programmatically under Department of Energy (DOE) Advanced Simulation and Computing (ASC) Program.
2013-2015	**Co-PI**, *Performance Insight for Programs and Exascale Runtimes (PIPER)*, $4,500,000.
	PI Martin Schulz, LLNL. DOE Advanced Scientific Computing Research (ASCR) X-Stack 2 Program.
2012-2014	**Co-PI**, *Performance Visualization at ExaScale (PeVES)*, $250,000.
	PI Timo Bremer, LLNL. University of California Laboratory Fees Research Program.
2012-2014	**Co-PI**, *Scalable Topology-Aware Task Embedding (STATE)*, $945,000.
	PI Abhinav Bhatele, LLNL. DOE LDRD Exploratory Research.
2012	**PI**, *Data Analytics for HPC*, $100,000.
	DOE LDRD Feasibility Study.

Time Allocation Grants

2013-2015	**Co-PI**, *Performance Evaluation and Analysis Consortium (PEAC)*, 120M core-hours.
	PI Lenny Oliker, LBNL. DOE Innovative and Novel Computational Impact on Theory and Experiment (INCITE) Program. 60M hours on ANL Mira; 50M hours on ORNL Titan; 10M hours on ANL Intrepid.
2013-2015	**Co-PI**, *Exploring energy efficiency, memory contention and application-tools-hardware co-design on a Xeon Phi cluster*, 1M core-hours. PI Abhinav Bhatele, LLNL. UTK Beacon Project..

Workshops Organized

2014-2015	**JOWOG 34: Applied Computer Science**, *Chair*.
	In 2014, established new annual meeting of JOWOG 34 on Applied Computer Science. Scalable algorithms & software for simulation codes at NNSA (LLNL, LANL, Sandia) and UK AWE. 100+ attendees in 2015.
2011-2012	**Workshop on High-performance Infrastructure for Scalable Tools (WHIST)**, *Chair*.
	Held twice at ICS. Proceedings published in special issue of ParCo Journal. 30 attendees.

Conference Committees

2015	**IEEE CLUSTER**, *Area Chair, Cluster Design and Architecture*.
2015	**PPoPP 2015**, *External Program Committee*.
2013-2014	**ACM/IEEE Supercomputing Conference (SC)**, *Technical Papers Committee*.
2011,2014	**ACM International Conference on Supercomputing (ICS)**, *Technical Papers Committee*.
2014	**IEEE International Parallel and Distributed Processing Symposium (IPDPS)**, *Tech. Papers*.
2013-2014	**IEEE/ACM Cluster, Cloud &Grid Computing (CCGrid)**, *Technical Papers Committee*.
2013-2014	**IEEE Big Data**, *Technical Papers Committee*.
2012-2013	**International Conference on Parallel Processing (ICPP)**, *Technical Papers Committee*.
2012	**IEEE CLUSTER**, *Technical Papers Committee*.
2012	**ACM/IEEE Supercomputing Conference (SC)**, *Posters Committee*.

Other Committees

2014-2015	**International Workshop on HPC User Support Tools (HUST)**, *Technical Papers.*
2010-2014	**Performance Modeling, Benchmarking, & Simulation (PMBS)**, *Steering Committee.*
2014	**International Workshop on Visual Performance Analytics (VPA)**, *Technical Papers.*
2014	**Hardware-Software Co-Design for High Performance Computing (Co-HPC)**, *Tech. Papers.*
2012-2014	**ACM Student Research Competition**, *Review Committee.*

Grant Reviewing

2015	**Computing and Communication Foundations (CCF)**, *NSF.*
2012	**Predictive Science Academic Alliance Program (PSAAP II)**, *DOE NNSA.*
2011	**Small Business Innovation Research (SBIR)**, *DOE Office of Science.*

Other Professional Activities

Organizing Cmte.	Parallel Architectures and Compilation Techniques (PACT) 2009
External Reviewing	IEEE TPDS, ParCo, IJHPCA, The Computer Journal, ISPASS'10, IPDPS'09, ICS'09, PACT'09
Memberships	IEEE, ACM, SIGHPC

Skills

General	C, C++, Fortran (linking), Python, numpy, Java, Ruby, Perl, git, svn, CVS, autotools, CMake.
High Performance Computing	Parallel performance tool development in C/C++. MPI & OpenMP profiling tools, runtime systems, debugger interfaces, stack tracing. Measurement, analysis, and tuning of parallel applications on large clusters (IBM Blue Gene, Cray, Linux). Experience with large physics codes at LLNL.
Data Analysis	Sampling, sequential and parallel clustering algorithms.
Enterprise Web Development	Server-side Java: MVC, Tomcat, Apache, Struts, Velocity, Atlassian plugins, Spring Framework; Maven, Ant; JDO, JDBC, SQL with Oracle. Other: Ruby on Rails, Mongrel server, LAMP stack.
Languages	English (fluent), Japanese (conversational)

Software Projects

see github.com/scalability-llnl to download.

Software developed by me

spack	Package manager/port system for HPC software, used by LLNL code teams.
cram	Tool for running ensembles of millions of small MPI jobs for Uncertainty Quantification.
rubik	Tool for building optimized task mappings for structured simulation codes on supercomputers.
callpath	Library for analyzing stack traces scalably in distributed applications.
wrap	Code generator for MPI profiling wrapper libraries. Used in Allinea DDT.
perf-dump	Dump per-process, per-thread PAPI counter data from MPI programs to HDF5 files.
muster	Scalable $O(log(P))$ parallel clustering library, used in performance/debugging tools.
nami	Parallel and sequential wavelet compression library.
libra	Scalable load-balance measurement/viewer tool for MPI simulations.

Software developed by my students and mentees

AutomaDeD	Massively scalable statistical control flow analysis and performance debugging.
Boxfish	Visual tool for projecting performance data onto network topologies.
MemAxes	Visual projection of memory performance data onto processor topologies.
Ravel	Visualization of MPI traces in logical, Lamport happened-before order.

Invited Talks & Panels

March 26, 2015   **Lawrence Berkeley National Laboratory**,
Invited Talk: Visualizing application semantics in performance tools, Berkeley, CA.

March 12, 2015   **DOE Exascale Computing Initiative Runtime Systems Workshop**,
Invited Talk: ASC's Tool Needs, Rockville, MD.

October, 2014   **College of William & Mary**,
Invited Talk: Measuring, Analyzing, and Visualizing Memory Performance, Williamsburg, VA.

August, 2014   **ASCR Workshop on Modeling & Simulation of Systems & Applications**,
Panel: Application Representation, Seattle, WA.

April, 2013   **University of Illinois**,
Invited Talk: Intuitive Visualizations for Performance Analysis at Scale, Urbana, IL.
Parallel Programming Laboratory, Charm++ Workshop.

June, 2010   **Tokyo Institute of Technology, Waseda University, Tokyo University**,
Invited Talk: Preparing for Exascale: Performance Analysis Research at LLNL, Tokyo, Japan.
Global Scientific Information and Computing Seminar.

Publications

Peer Reviewed Conference & Journal Papers

[1] Katherine E. Isaacs, **Todd Gamblin**, Abhinav Bhatele, Martin Schulz, Bernd Hamann, and Peer-Timo Bremer. Ordering Traces Logically to Identify Lateness in Message Passing Programs. *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, 2015. To appear.

[2] **Todd Gamblin**, Matthew P. LeGendre, Michael R. Collette, Gregory L. Lee, Adam Moody, Bronis R. de Supinski, and W. Scott Futral. The Spack Package Manager: Bringing order to HPC software chaos. In *Supercomputing 2015 (SC'15)*, Austin, Texas, November 15-20 2015. LLNL-CONF-669890, (22% accepted).

[3] Katherine E. Isaacs, Abhinav Bhatele, Jonathan Lifflander, David Böhme, **Todd Gamblin**, Martin Schulz, Bernd Hamann, and Peer-Timo Bremer. Analyzing the structure of execution traces from task-based parallel runtimes. In *Supercomputing 2015 (SC'15)*, Austin, Texas, November 15-20 2015. LLNL-CONF-670046, (22% accepted).

[4] Ignacio Laguna, Dong H. Ahn, Bronis R. de Supinski, **Todd Gamblin**, Gregory L. Lee, Martin Schulz, Saurabh Bagchi, Milind Kulkarni, Bowen Zhou, Zhezhe Chen, and Feng Qin. Debugging high-performance computing applications at massive scales. *Communications of the ACM*, September 2015. LLNL-JRNL-652400. To appear.

[5] Abhinav Bhatele, Andrew R. Titus, Jayaraman J. Thiagarajan, Nikhil Jain, **Todd Gamblin**, Peer-Timo Bremer, Martin Schulz, and Laxmikant V. Kale. Identifying the Culprits behind Network Congestion. In *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS'14)*, Hyderabad, INDIA, May 25-29 2015. LLNL-CONF-663150, (21.8% accepted).

[6] Abhinav Bhatele, Nikhil Jain, Katherine Isaacs, Ronak Buch, **Todd Gamblin**, Steven H. Langer, and Laxmikant V. Kale. Optimizing the performance of parallel applications on a 5D torus via task mapping. In *International Conference on High Performance Computing (HiPC'14)*, Goa, India, December 17-20 2014. LLNL-CONF-655465.

[7] Alfredo Giménez, **Todd Gamblin**, Barry Rountree, Abhinav Bhatele, Ilir Jusufi, Bernd Hamann, and Peer-Timo Bremer. Dissecting On-Node Memory Access Performance: A Semantic Approach. In *Supercomputing 2014 (SC'14)*, New Orleans, LA, November 16-21 2014. LLNL-CONF-658626, (20.8% accepted).

[8] Katherine E. Isaacs, Peer-Timo Bremer, Ilir Jusufi, **Todd Gamblin**, Abhinav Bhatele, Martin Schulz, and Bernd Hamann. Combing the Communication Hairball: Visualizing Parallel Execution Traces using Logical Time. In *IEEE Symposium on Information Visualization (INFOVIS'14)*, Paris, France, November 9-14 2014. LLNL-JRNL-657418, (23% accepted).

[9] Ignacio Laguna, David F. Richards, **Todd Gamblin**, Martin Schulz, and Bronis R. de Supinski. Evaluating User-Level Fault Tolerance for MPI Applications. In *EuroMPI/Asia 2014*, Kyoto, Japan, September 9-12 2014. LLNL-CONF-656877, (46% accepted).

[10] Olga Pearce, **Todd Gamblin**, Bronis R. de Supinski, Tom Arsenlis, and Nancy M. Amato. Load Balancing N-body Simulations with Highly Non-Uniform Density. In *International Conference on Supercomputing (ICS'14)*, Munich, Germany, June 10-13 2014. LLNL-CONF-648577, (20.9% accepted).

[11] Katherine E. Isaacs, Abhinav Bhatele, Peer-Timo Bremer, **Todd Gamblin**, Alfredo Gimenez, Bernd Hamann, Ilir Jusufi, and Martin Schulz. State of the Art of Performance Visualization. In R. Borgo, R. Maciejewski, and I. Viola, editors, *Eurographics Conference on Visualization (EuroVis'14)*, Swansea, Wales, UK, June 9-13 2014. LLNL-CONF-652873.

[12] Subrata Mitra, Ignacio Laguna, Dong H. Ahn, Saurabh Bagchi, Martin Schulz, and **Todd Gamblin**. Accurate application progress analysis for large-scale parallel debugging. In *Programming Langauge Design and Implementation (PLDI'14)*, Edinburgh, UK, June 9-11 2014. LLNL-CONF-646258, (18% accepted).

Best Paper [13] Kento Sato, Kathryn Mohror, Adam Moody, **Todd Gamblin**, Bronis R. de Supinski, Naoya Maruyama, and Satoshi Matsuoka. A user-level infiniband-based file system and checkpoint strategy for burst buffers. In *IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid'14)*, Chicago, IL, May 26-29, 2014 2014. LLNL-CONF-645876, (19% accepted).

[14] Ignacio Laguna, Dong H. Ahn, Bronis R. de Supinski, Saurabh Bagchi, and **Todd Gamblin**. Diagnosis of performance faults in large scale mpi applications via probabilistic progress-dependence inference. *IEEE Transactions on Parallel and Distributed Systems (TPDS)*, May 22 2014. LLNL-JRNL-643939.

[15] Kento Sato, Adam Moody, Kathryn Mohror, **Todd Gamblin**, Bronis R. de Supinski, Naoya Maruyama, and Satoshi Matsuoka. FMI: Fault Tolerant Messaging Interface for Fast and Transparent Recovery. In *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS'14)*, Phoenix, AZ, May 19-23 2014. LLNL-CONF-645209, (21% accepted).

[16] Nikhil Jain, Abhinav Bhatele, Michael P. Robson, **Todd Gamblin**, and Laxmikant V. Kale. Predicting application performance using supervised learning on communication features. In *Supercomputing 2013 (SC'13)*, Denver, CO, November 17-22 2013. LLNL-CONF-556491, (20% accepted).

[17] Lukasz G. Szafaryn, **Todd Gamblin**, Bronis R. de Supinski, and Kevin Skadron. Trellis: Portability across architectures with a high-level framework. *J. Parallel Distrib. Comput.*, 73(10):1400–1413, July 18 2013.

Best Paper [18] Wolfgang Frings, Dong H. Ahn, Matthew LeGendre, **Todd Gamblin**, Bronis R. de Supinski, and Felix Wolf. Massively parallel loading. In *International Conference on Supercomputing (ICS'13)*, Eugene, OR, June 10-14 2013. LLNL-CONF-610893, (21% accepted).

[19] Dong H. Ahn, Michael J. Brim, Bronis R. de Supinski, **Todd Gamblin**, Gregory L. Lee, Matthew P. LeGendre, Barton P. Miller, Adam Moody, and Martin Schulz. Efficient and Scalable Retrieval Techniques for Global File Properties. In *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS'13)*, Boston, MA, May 20-24 2013. LLNL-PROC-554055, (21% accepted).

[20] Barry Rountree, **Todd Gamblin**, Bronis R. de Supinski, Martin Schulz, David K. Lowenthal, Guy Cobb, and Henry Tufo. Parallelizing heavyweight debugging tools with MPIEcho. *Parallel Computing*, 39(3):156–166, March 2013.

[21] Abhinav Bhatele, **Todd Gamblin**, Katherine E. Isaacs, Brian T. N. Gunney, Martin Schulz, Peer-Timo Bremer, and Bernd Hamann. Novel views of performance data to analyze large-scale

adaptive applications. In *Supercomputing 2012 (SC'12)*, Salt Lake City, UT, November 10-16 2012. LLNL-CONF-554552, (21% accepted).

[22] Abhinav Bhatele, **Todd Gamblin**, Steven H. Langer, Peer-Timo Bremer, Erik W. Draeger, Bernd Hamann, Katherine E. Isaacs, Aaditya G. Landge, Joshua A. Levine, Valerio Pascucci, Martin Schulz, and Charles H. Still. Mapping applications with collectives over sub-communicators on torus networks. In *Supercomputing 2012 (SC'12)*, Salt Lake City, UT, November 10-16 2012. LLNL-CONF-556491, (21% accepted).

[23] Kento Sato, Adam Moody, Kathryn Mohror, **Todd Gamblin**, Bronis R. de Supinski, Naoya Maruyama, and Satoshi Matsuoka. Design and modeling of a non-blocking checkpointing system. In *Supercomputing 2012 (SC'12)*, Salt Lake City, UT, November 10-16 2012. LLNL-CONF-554431, (21% accepted).

[24] Aaditya G. Landge, Joshua A. Levine, Katherine E. Isaacs, Abhinav Bhatele, **Todd Gamblin**, Martin Schulz, Steven H. Langer, Peer-Timo Bremer, and Valerio Pascucci. Visualizing network traffic to understand the performance of massively parallel simulations. In *IEEE Symposium on Information Visualization (INFOVIS'12)*, Seattle, WA, October 14-19 2012. LLNL-CONF-543359, (25% accepted).

[25] Ignacio Laguna, Dong H. Ahn, Bronis R. de Supinski, Saurabh Bagchi, and **Todd Gamblin**. Probabilistic diagnosis of performance faults in large scale parallel applications. In *International Conference on Parallel Architectures and Compilation Techniques (PACT'12)*, Minneapolis, MN, September 19-23 2012. LLNL-PROC-548642, (18% accepted).

[26] Olga Pearce, **Todd Gamblin**, Bronis R. de Supinski, Martin Schulz, and Nancy M. Amato. Quantifying the Effectiveness of Load Balance Algorithms. In *International Conference on Super-computing (ICS'12)*, Venice, Italy, June 25-29 2012. LLNL-CONF- 523343, (22.3% accepted).

[27] Spyros Lyberis, Polyvios Pratikakis, Dimitrios Nikolopoulos, Martin Schulz, **Todd Gamblin**, and Bronis de Supinski. The myrmics memory allocator: Hierarchical, message-passing allocation for global address spaces. In *International Symposium on Memory Management (ISMM'12)*, Beijing, China, June 15-16 2012. LLNL-CONF-545875.

[28] Sandeep Budanur, Frank Mueller, and **Todd Gamblin**. Memory Trace Compression and Replay for SPMD Systems using Extended PRSDs. *Computer Journal*, 55(2):206–217, February 2012. LLNL-CONF-460598.

[29] Allison H. Baker, Robert D. Falgout, **Todd Gamblin**, Tzanio V. Kolev, Martin Schulz, and Ulrike Meier Yang. Scaling Algebraic Multigrid Solvers: On the Road to Exascale. *Competence in High Performance Computing (CiHPC)*, Dec 2011. LLNL-PROC-463941.

[30] Ignacio Laguna, **Todd Gamblin**, Bronis R. de Supinski, Saurabh Bagchi, Greg Bronevetsky, Dong H. Ahn, Martin Schulz, and Barry Rountree. Large scale debugging of parallel tasks with AutomaDeD. In *Supercomputing 2011 (SC'11)*, Seattle, WA, November 12-18 2011. LLNL-CONF-486911, (21% accepted).

[31] Martin Schulz, Joshua A. Levine, Peer-Timo Bremer, **Todd Gamblin**, and Valerio Pascucci. Interpreting performance data across intuitive domains. In *International Conference on Parallel Processing (ICPP'11)*, Taipei, Taiwan, September 13-16 2011. LLNL-CONF-476091, (22% accepted).

[32] Allison H. Baker, **Todd Gamblin**, Martin Schulz, and Ulrike Meier Yang. Challenges of Scaling Algebraic Multigrid across Modern Multicore Architectures. In *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS'11)*, Anchorage, Alaska, May 16-20 2011. LLNL-CONF- 458074, (19.6% accepted).

[33] Zoltan Szebenyi, **Todd Gamblin**, Martin Schulz, Bronis R. de Supinski, Felix Wolf, and Brian J. N. Wylie. Reconciling sampling and direct instrumentation for unintrusive call-path profiling of MPI

programs. In *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS'11)*, Anchorage, Alaska, May 16-20 2011. LLNL-CONF-468224, (19.6% accepted).

[34] **Todd Gamblin**, Bronis R. de Supinski, Martin Schulz, Robert J. Fowler, and Daniel A. Reed. Clustering performance data efficiently at massive scales. In *International Conference on Super-computing (ICS'10)*, Tsukuba, Japan, June 1-4 2010. LLNL-CONF-422684, (18.5% accepted).

[35] Bronis R. de Supinski, Sadaf Alam, David H. Bailey, Laura Carrington, Chris Daley, Anshu Dubey, **Todd Gamblin**, Dan Gunter, Paul D. Hovland, Heike Jagode, Karen Karavanic, Gabriel Marin, John Mellor-Crummey, Shirley Moore, Boyana Norris, Leonid Oliker, Catherine Olschanowsky, Philip C. Roth, Martin Schulz, Sameer Shende, Allan Snavely, Wyatt Spear, Mustafa Tikir, Jeff Vetter, Pat Worley, and Nicholas Wright. Modeling the office of science ten year facilities plan: The PERI architecture tiger team. *Journal of Physics: Conference Series, SciDAC 2009*, 2009. LLNL-CONF-413427.

[36] Robert J. Fowler, Laksono Adhianto, Bronis R. de Supinski, Mike Fagan, **Todd Gamblin**, Mark Krentel, John Mellor-Crummey, Martin Schulz, and Nathan Tallent. Frontiers of performance analysis on leadership class systems. *Journal of Physics: Conference Series, SciDAC 2009*, 2009. LLNL-CONF-413969.

[37] **Todd Gamblin**, Bronis R. de Supinski, Martin Schulz, Robert J. Fowler, and Daniel A. Reed. Scalable load-balance measurement for SPMD codes. In *Supercomputing 2008 (SC'08)*, Austin, Texas, November 15-21 2008. LLNL-CONF-406045, (21.3% accepted).

[38] Robert J. Fowler, **Todd Gamblin**, Allan K. Porterfield, Patrick Dreher, Song Huang, and Balint Joo. Performance engineering challenges: The view from RENCI. *Journal of Physics: Conference Series, SciDAC 2008*, 125:5, August 2008.

[39] **Todd Gamblin**, Robert J. Fowler, and Daniel A. Reed. Scalable methods for monitoring and detecting behavioral classes in scientific codes. In *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS'08)*, Miami, FL, April 14-18 2008. (25.6% accepted).

Workshop Papers & Technical Reports

[40] Ignacio Laguna, **Todd Gamblin**, Kathryn Mohror, and Martin Schulz. A global exception fault tolerance model for mpi. In *Workshop on Exascale MPI (ExaMPI14), held at Supercomputing 2014 (SC'14)*, New Orleans, LA, November 17 2014. LLNL-CONF-XXXXXX.

[41] **Todd Gamblin**, Martin Schulz, Timo Bremer, and Abhinav Bhatele. Building models from measurement with multi-domain correlation. In *DOE Workshop on Modeling & Simulation of Exascale Systems & Applications (ModSim 2013)*, Seattle, WA, September 18-19 2013. LLNL-CONF-639760.

[42] Abhinav Bhatele and **Todd Gamblin**. OS/Runtime challenges for dynamic topology aware mapping. In *U.S. Department of Energy Exascale Operating Systems and Runtime Research Workshop (ExaOSR)*, Washington, DC, October 2012. LLNL-MI-563334.

[43] Kento Sato, Adam Moody, Kathryn Mohror, **Todd Gamblin**, Bronis R. de Supinski, Naoya Maruyama, and Satoshi Matsuoka. Towards a light-weight non-blocking checkpointing system. In *HPC in Asia Workshop 2012*, Hamburg, Germany, June 17 2012.

[44] Kento Sato, Adam Moody, Kathryn Mohror, **Todd Gamblin**, Bronis R. de Supinski, Naoya Maruyama, and Satoshi Matsuoka. Design and modeling of a non-blocking checkpoint system. In *ATIP - A*CRC Workshop on Accelerator Technologies in High Performance Computing*, May 7-10 2012.

[45] Steven Langer, Abhinav Bhatele, **Todd Gamblin**, Bert Still, Denise Hinkel, Mike Kumbera, Bruce Langdon, and Ed Williams. Simulating Laser-Plasma Interaction in Experiments at the National Ignition Facility on a Cray XE6. In *Cray Users Group (CUG 2012)*, Stuttgart, Germany, April 29-May 3 2012. LLNL-PROC-547711.

[46] Kento Sato, Adam Moody, Kathryn Mohror, **Todd Gamblin**, Bronis R. de Supinski, Naoya Maruyama, and Satoshi Matsuoka. Towards an asynchronous checkpointing system. In *IPSJ SIG Technical Reports 2011-ARC-197 2011-HPC-132 (HOKKE-19)*, November 2011. LLNL-CONF-509152.

[47] Martin Schulz, Abhinav Bhatele, Peer-Timo Bremer, **Todd Gamblin**, Katherine Isaacs, Joshua Levine, and Valerio Pascucci. Creating a Tool Set for Optimizing Topology-aware Node Mappings. In *5th ZIH Parallel Tools Workshop*, Dresden, Germany, September 26-27 2011. LLNL-CONF-402937.

[48] **Todd Gamblin**, Martin Schulz, Peer-Timo Bremer, Joshua A. Levine, and Valerio Pascucci. Intuitive performance visualization techniques for topological analysis on capability machines. In *Kagoshima Summer United Workshops on Parallel, Distributed, and Cooperative Processing*, Kagoshima, Japan, July 26-29 2011. LLNL-CONF- 490044.

[49] Barry Rountree, Guy Cobb, **Todd Gamblin**, Martin Schulz, Bronis R. de Supinski, and Henry Tufo. Parallelizing heavyweight debugging tools with MPIecho. In *Workshop on High-performance Infrastructure for Scalable Tools (WHIST'11)*, Tucson, Arizona, June 4 2011. LLNL-CONF-481092.

[50] Lukasz G. Szafaryn, **Todd Gamblin**, Bronis R. de Supinski, and Kevin Skadron. Experiences with achieving portability across heterogeneous architectures. In *Workshop on Domain-Specific Languages and High-Level Frameworks for High Performance Computing (WOLFHPC'11)*, Tucson, Arizona, May 31 2011. LLNL-CONF-486291.

[51] Sandeep Budanur, Frank Mueller, and **Todd Gamblin**. Memory Trace Compression and Replay for SPMD Systems using Extended PRSDs. In *First International Workshop on Performance Modeling, Benchmarking and Simulation of High Performance Computing Systems (PMBS'10)*, New Orleans, LA, November 15 2010. LLNL-CONF-460598.

[52] Frank Mueller, Xing Wu, Martin Schulz, **Todd Gamblin**, and Bronis R. de Supinski. ScalaTrace: Tracing, analysis and modeling of HPC codes at scale. In *Para 2010*, Reykjavik, Iceland, June 6-9 2010. LLNL-CONF-427005.

[53] Bronis R. de Supinski, Robert J. Fowler, **Todd Gamblin**, Frank Mueller, Martin Schulz, and Prasun Ratn. An open framework for scalable, reconfigurable analysis. In *International Workshop on Scalable Tools for High-End Computing (STHEC)*, Kos, Greece, June 7-12 2008. LLNL-CONF-403954.

[54] Francisco Chinchilla, **Todd Gamblin**, Morten Sommervoll, and Jan F. Prins. Parallel N-body simulation using GPUs. Technical Report TR04-032, University of North Carolina at Chapel Hill, December 2004.

Special Issues, Book Chapters, Articles

[55] Martin Schulz, Jim Belak, Abhinav Bhatele, Peer-Timo Bremer, Greg Bronevetsky, Marc Casas, **Todd Gamblin**, Katherine E. Isaacs, Ignacio Laguna, Joshua Levine, Valerio Pascucci, David Richards, and Barry Rountree. Performance Analysis Techniques for the Exascale Co-Design Process. In Michael Bader, Arndt Bode, Hans-Joachim Bungartz, Michael Gerndt, Gerhard R. Joubert, and Frans Peters, editors, *Parallel Computing: Accelerating Computational Science and Engineering*, volume 25 of *Advances in Parallel Computing*, pages 19–32. IOS Press, 2014. LLNL-CONF-645777.

[56] Nathan R. Tallent and **Todd Gamblin**, editors. *Special Issue on High-performance Infrastructure for Scalable Tools*, volume 39(3) of *Parallel Computing: Systems & Applications*. March 2013.

[57] **Todd Gamblin**. Collaboration Leads to Advances in Power Grid Modeling. In *2010 Computation Annual Report*, page 32. Lawrence Livermore National Laboratory, 2010. LLNL-TR-470873.

[58] Robert J. Fowler, **Todd Gamblin**, Gopi Kandaswamy, Anirban Mandal, Allan K. Porterfield, Lavanya Ramakrishnan, and Daniel A. Reed. Challenges of scale: When all computing becomes grid computing. In Lucio Grandinetti, editor, *High Performance Computing and Grids in Action*, volume 16 of *Advances in Parallel Computing*, pages 186–206. IOS Press, Amsterdam, 2007.

Ph.D. Dissertation

[59] **Todd Gamblin**. *Scalable Performance Measurement and Analysis*. PhD thesis, University of North Carolina at Chapel Hill, Chapel Hill, NC, August 2009. LLNL-TH-419482.

Posters & Presentations

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