

# 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*.

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## Awards & Honors

- 2019 R&D 100 Award for Spack: A Package Manager for Supercomputers
- 2019 R&D 100 Special Recognition for Spack: Silver Medalist in the “Market Disruptor” category
- 2019 Top Technology Development: Federal Laboratory Consortium Regional Award for Spack
- 2017 LLNL Early and Mid-Career Recognition (EMCR) Award
- 2017 LLNL WCI Directorate Award
- 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
- 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

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## Experience

- Oct 2010-present **Lawrence Livermore National Laboratory**, *Computer Scientist*.
  - Research and develop tools to measure & analyze performance data from parallel scientific simulations.
  - Lead: deployment of the Sonar cluster: data analytics for the Livermore Computing Center.
  - Lead: Spack package manager project: combinatorial builds of over 2,300 HPC packages ([spack.io](http://spack.io)).
  - Lead: DevRAMP: Reproducibility, Analysis, Monitoring, and Performance for Developers.  
DevOps/collaboration team within Livermore Computing.
- 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.
- 2002-2003 **ValueCommerce, Co., Ltd.**, *Software Developer*, Tokyo, Japan.  
Developed control panel for web hosting application; conducted performance analysis for ad servers.
- 2001-2002 **Williams College**, *Undergraduate Research Assistant*.  
Investigated cache-conscious memory performance optimizations.
- Summer 2001 **EMC Corporation**, *Summer Intern*, Research Triangle Park, NC.  
Developed distributed performance monitoring tools and web-based user interface for NAS servers.
- Summer 2000 **EMC Corporation**, *Summer Intern*, Research Triangle Park, NC.  
Developed distributed, cross-platform performance monitoring tool for large networks.
- Summer 1999 **NCSU Physics Department**, *Summer Research Assistant*.  
Designed imaging algorithms and an archival website for the Diffraction Enhanced Imaging (DEI) Group.

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## Research and Other Funding

- 2016-present **PI**, *DevRAMP: Reproducibility, Analysis, Monitoring, and Performance for Developers*, programmatic,  $\approx 3$  FTE/yr.  
Department of Energy (DOE) Advanced Simulation and Computing (ASC) ATDM Program.
- 2017-2018 **PI**, *LLNL Early and Mid-Career Recognition Award*, 20% FTE/yr.  
Recognized by LLNL and funded to work on expanding the Spack community.
- 2017-present **Co-PI**, *IDEAS-ECP: Software Productivity for the Exascale Computing Project*, PIs Mike Heroux and Lois Curfman McInnes, \$225k/yr.  
U.S. Exascale Computing Project
- 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.  
Department of Energy (DOE) Advanced Simulation and Computing (ASC) Program.
- 2015-present **PI**, *Containers and Secure Services for HPC*, \$100k/yr.  
LLNL ISCP Project
- 2014-2017 **PI**, *Sonar: An Analytics Cluster for Livermore Computing Performance Data*, \$100,000/yr.  
LLNL Computation TechBase Project
- 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.

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## Time Allocation Grants

- 2013-2018 **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. Provided millions of compute hours for CS researchers on ANL Intrepid, Mira, and Theta; and ORNL Titan systems.
- 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..

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## Conferences & Workshops Organized

- 2017 **IEEE CLUSTER**, *General Chair*.  
Location to be announced at IEEE CLUSTER 2016

- 2014-2016 **JOWOG 34: Applied Computer Science**, *Co-Chair, Founder*.  
Scalable algorithms & simulation techniques for LLNL, LANL, Sandia (US) and AWE (UK). 100+ attendees.
- 2015-2016 **International Workshop on HPC User Support Tools (HUST)**, *Co-Chair*.  
Held at SC15-16 in cooperation with SIGHPC.
- 2016 **Workshop on Variability in Parallel and Distributed Systems (VarSys)**, *Co-Chair*.  
Held at IPDPS'16.
- 2016 **Workshop on Emerging Parallel and Distributed Runtime Systems and Middleware (IPDRM'16)**, *Co-Chair*.  
Held at IPDPS'16.
- 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

- 2019 **ACM/IEEE Supercomputing Conference (SC)**, *Technical Papers Committee*.
- 2019 **ACM Symp. on Principles and Practices of Parallel Programming (PPoPP)**, *Finance Chair*.
- 2018 **ACM/IEEE Supercomputing Conference (SC)**, *Vice Chair, Technical Papers*.
- 2017 **ACM/IEEE Supercomputing Conference (SC)**, *Posters Committee*.
- 2017 **Parallel Architectures and Compilation Techniques (PACT)**, *Technical Papers Committee*.
- 2014-2017 **International Workshop on HPC User Support Tools (HUST)**, *Technical Papers*.
- 2014-2017 **International Workshop on Visual Performance Analytics (VPA)**, *Technical Papers*.
- 2016 **International Conference on Parallel Processing (ICPP)**, *Technical Papers Committee*.
- 2012-2016 **ACM Student Research Competition**, *Review Committee*.
- 2010-2016 **Performance Modeling, Benchmarking, & Simulation (PMBS)**, *Steering Committee*.
- 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*.
- 2014 **Hardware-Software Co-Design for High Performance Computing (Co-HPC)**, *Technical Papers Committee*.
- 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*.
- 2009 **Parallel Architectures and Compilation Techniques (PACT)**, *Organizing 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*.

## Memberships

- Professional IEEE, ACM, SIGHPC
- Teaching Software Carpentry Certified Instructor
- Open Source OpenHPC Technical Steering Committee (Developer Tools Representative)

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## 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)

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## Software Projects

*see [github.com/LLNL](https://github.com/LLNL) to download.*

spack	Package manager for HPC software, used widely by developers and HPC centers.
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 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.

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## Invited Talks, Panels, and Podcasts

July 16, 2019	<b>The Manifest (Podcast),</b> <i>Spack</i> , Hosts: Andrew Nesbitt and Alex Pounds.
October 26, 2018	<b>Let's Talk Exascale (Podcast),</b> <i>Spack: The Deployment Tool for ECP's Software Stack</i> , Host: Scott Gibson.
February 6, 2018	<b>The Changelog (Podcast),</b> <i>Moore's Law and High Performance Computing</i> , Hosts: Jerod Santo and Adam Stacoviak.
July 16, 2017	<b>Request for Commits (Podcast),</b> <i>Open Source and Supercomputers (Spack)</i> , Hosts: Nadia Eghbal and Mikeal Rogers.
June 2, 2017	<b>4th International Workshop on Reproducibility in Parallel Computing (REPPAR'17),</b> <i>Spack and Reproducibility in HPC</i> , Orlando, FL. Held at the International Parallel and Distributed Processing Symposium (IPDPS'17)
February 26, 2016	<b>Tokyo Institute of Technology,</b> <i>Measuring and Analyzing Entire HPC Centers: The Sonar Project at LLNL</i> , Tokyo, Japan.
January 29, 2016	<b>University of California, Merced,</b> <i>Measuring and Analyzing Entire HPC Centers: The Sonar Project at LLNL</i> , Merced, CA.
March 26, 2015	<b>Lawrence Berkeley National Laboratory,</b> <i>Visualizing application semantics in performance tools</i> , Berkeley, CA.
October, 2014	<b>College of William &amp; Mary,</b> <i>Measuring, Analyzing, and Visualizing Memory Performance</i> , Williamsburg, VA.

- August, 2014 **ASCR Workshop on Modeling & Simulation of Systems & Applications**,  
*Panel: Application Representation*, Seattle, WA.
- April, 2013 **University of Illinois, Charm++ Workshop**,  
*Intuitive Visualizations for Performance Analysis at Scale*, Urbana, IL.
- June, 2010 **Tokyo Institute of Technology, Waseda University, Tokyo University**,  
*Preparing for Exascale: Performance Analysis Research at LLNL*, Tokyo, Japan.

## Publications

### Peer Reviewed Conference & Journal Papers

- [1] Katherine E. Isaacs and **Todd Gamblin**. Preserving command line workflow for a package management system using ascii dag visualization. *IEEE Transactions on Visualization and Computer Graphics*, 25(9), 2019.
- [2] Abhinav Bhatele, Stephanie Brink, and **Todd Gamblin**. Hatchet: Pruning the overgrowth in parallel profiles. In *Supercomputing 2019 (SC'19)*, Denver, CO, November 17-22 2019.
- [3] Ian Karlin, Yoonho Park, Bronis R. de Supinski, Peng Wang, Bert Still, David Beckingsale, Robert Blake, Tong Chen, Guojing Cong, Carlos H. A. Costa, Johann Dahm, Giacomo Domeniconi, Thomas Epperly, Aaron Fisher, Sara Kokkila Schumacher, Steven H. Langer, Hai Le, Eun Kyung Lee, Naoya Maruyama, Xinyu Que, David F. Richards, Björn Sjögreen, Jonathan Wong, Carol S. Woodward, Ulrike Meier Yang, Xiaohua Zhang, Bob Anderson, David Appelhans, Levi Barnes, Peter D. Barnes Jr., Sorin Bastea, David Böhme, Jamie A. Bramwell, James M. Brase, José R. Brunheroto, Barry Chen, Charway R. Cooper, Tony Degroot, Robert D. Falgout, **Todd Gamblin**, David J. Gardner, James N. Glosli, John A. Gunnels, Max Katz, Tzanio V. Kolev, I-Feng W. Kuo, Matthew P. LeGendre, Ruipeng Li, Pei-Hung Lin, Shelby Lockhart, Kathleen McCandless, Claudia Misale, Jaime H. Moreno, Rob Neely, Jarom Nelson, Rao Nimmakayala, Kathryn M. O'Brien, Kevin O'Brien, Ramesh Pankajakshan, Roger Pearce, Slaven Peles, Phil Regier, Steve Rennich, Martin Schulz, Howard Scott, James C. Sexton, Kathleen Shoga, Shiv Sundram, Guillaume Thomas-Collignon, Brian Van Essen, Alexey Voronin, Bob Walkup, Lu Wang, Chris Ward, Hui-Fang Wen, Daniel A. White, Christopher Young, Cyril Zeller, and Edward Zywickz. Preparation and optimization of a diverse workload for a large-scale heterogeneous system. In *Supercomputing 2019 (SC'19)*, Denver, CO, November 17-22 2019.
- [4] Tao Wang, Nikhil Jain, David Böhme, Frank Mueller, and **Todd Gamblin**. Funcytuner: Auto-tuning scientific applications with per-loop compilation. In *International Conference on Parallel Processing (ICPP'19)*, Tsukuba, Japan, August 5-8 2019.
- [5] Abhinav Bhatele, Nikhil Jain, Misbah Mubarak, and **Todd Gamblin**. Analyzing Cost-Performance Tradeoffs of HPC Network Designs under Different Constraints using Simulations. In *SIGSIM PADS 2019*, Chicago, IL, June 3-5 2019.
- [6] Prasanna Balaprakash, Jack Dongarra, **Todd Gamblin**, Mary Hall, Jeffrey K. Hollingsworth, Boyana Norris, and Rich Vuduc. Autotuning in High-Performance Computing Applications. *Proceedings of the IEEE*, pages 1–16, 2018.
- [7] Alfredo Giménez, **Todd Gamblin**, Ilir Jusufi, Abhinav Bhatele, Martin Schulz, Peer-Timo Bremer, and Bernd Hamann. MemAxes: Visualization and Analytics for Characterizing Complex Memory Performance Behaviors. *IEEE Transactions on Visualization and Computer Graphics*, 24(7):2180–2193, 2018.
- [8] Michael R. Wyatt II, Stephen N. Herbein, **Todd Gamblin**, Adam Moody, Dong H. Ahn, and Michela Taufer. PRIONN: Predicting Runtime and IO using Neural Networks. In *International Conference on Parallel Processing (ICPP'18)*, Eugene, OR, August 13-16 2018. LLNL-CONF-739253.
- [9] Jayaraman J. Thiagarajan, Nikhil Jain, Rushil Anirudh, Alfredo Giménez, Rahul Sridhar, Aniruddha Marathe, Tao Wang, Murali Emani, Abhinav Bhatele, and **Todd Gamblin**. Bootstrapping Parameter Space Exploration for Fast Tuning. In *International Conference on Supercomputing (ICS'18)*, Beijing, China, June 12-15 2018. LLNL-CONF-750296.
- [10] Jayaraman J. Thiagarajan, Rushil Anirudh, Bhavya Kaikhura, Nikhil Jain, Tanzima Islam, Abhinav Bhatele, Jae-Seung Yeom, and **Todd Gamblin**. PADDLE: Performance Analysis using a Data-driven Learning Environment. In *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS'18)*, Vancouver, BC, Canada, May 21-25 2018. LLNL-CONF-740303.
- [11] Alfredo Giménez, **Todd Gamblin**, Abhinav Bhatele, Chad Wood, Kathleen Shoga, Aniruddha Marathe, Peer-Timo Bremer, Bernd Hamann, and Martin Schulz. ScrubJay: Deriving Knowledge from the Disarray of HPC Performance Data. In *Supercomputing 2017 (SC'17)*, Denver, CO, November 13-16 2017.



- [12] Nikhil Jain, Abhinav Bhatele, Louis Howell, David Böhme, Ian Karlin, Edgar Leon, Misbah Mubarak, Noah Wolfe, **Todd Gamblin**, and Matthew Leininger. Predicting the Impact of Fat-tree Configurations on Applications and Multi-job Workloads. In *Supercomputing 2017 (SC'17)*, Denver, CO, November 13-16 2017.
- [13] Aniruddha Marathe, Nikhil Jain, Rushil Anirudh, Abhinav Bhatele, Jayaraman J. Thiagarajan, Bhavya Kaikhura, Jae-Seung Yeom, Barry Rountree, and **Todd Gamblin**. Power-aware Parameter Tuning of HPC Applications using Machine Learning. In *Supercomputing 2017 (SC'17)*, Denver, CO, November 13-16 2017.
- [14] David Beckingsale, Olga Pearce, Ignacio Laguna, and **Todd Gamblin**. Apollo: Fast, Dynamic Tuning for Data-Dependent Code. In *IEEE International Parallel & Distributed Processing Symposium (IPDPS'17)*, Orlando, FL, USA, May 29-June 2 2017. LLNL-CONF-723337.
- [15] Nikhil Jain, Abhinav Bhatele, Xiang Ni, **Todd Gamblin**, and Laxmikant V. Kale. Express Mesh: A Partitionable Low-Diameter Network that Eliminates Inter-job Interference. In *IEEE International Parallel & Distributed Processing Symposium (IPDPS'17)*, Orlando, FL, USA, May 29-June 2 2017. LLNL-CONF-706801.
- [16] Hao Xu, Shasha Wen, Alfredo Gimenez, **Todd Gamblin**, and Xu Liu. DR-BW: Identifying Bandwidth Contention in NUMA Architectures with Supervised Learning. In *IEEE International Parallel & Distributed Processing Symposium (IPDPS'17)*, Orlando, FL, USA, May 29-June 2 2017.
- [17] David Böhme, **Todd Gamblin**, David Beckingsale, Peer-Timo Bremer, Alfredo Giménez, Matthew LeGendre, Olga Pearce, and Martin Schulz. Caliper: Performance Introspection for HPC Software Stacks. In *Supercomputing 2016 (SC'16)*, Salt Lake City, UT, November 13-18 2016. LLNL-CONF-699263.
- [18] Tanzima Z. Islam, Jayaraman J. Thiagarajan, Abhinav Bhatele, Martin Schulz, and **Todd Gamblin**. A Machine-Learning Framework for Performance Coverage Analysis of Proxy Applications. In *Supercomputing 2016 (SC'16)*, Salt Lake City, UT, November 13-18 2016. LLNL-CONF-696018.
- [19] Nikhil Jain, Abhinav Bhatele, Sam White, **Todd Gamblin**, and Laxmikant V. Kale. Evaluating HPC Networks via Simulation of Parallel Workloads. In *Supercomputing 2016 (SC'16)*, Salt Lake City, UT, November 13-18 2016. LLNL-CONF-690662.
- [20] Ryan McKenna, Stephen N. Herbein, Adam Moody, **Todd Gamblin**, and Michela Taufer. Forecasting traffic to parallel filesystems from hpc clusters. In *IEEE Cluster 2016 (CLUSTER'16)*, Taipei, Taiwan, September 12-16 2016. LLNL-CONF-691797.
- [21] Olga Pearce, **Todd Gamblin**, Bronis R. de Supinski, Martin Schulz, and Nancy M. Amato. MPMD Framework for Offloading Load Balance Computation. In *Proceedings of the International Parallel and Distributed Processing Symposium (IPDPS'16)*, Chicago, IL, May 23-27, 2016 2016. LLNL-CONF-665393.
- [22] Ignacio Laguna, David F. Richards, **Todd Gamblin**, Martin Schulz, Bronis R. de Supinski, Kathryn Mohror, and Howard Pritchard. Evaluating and Extending User-Level Fault Tolerance in MPI. *International Journal of High Performance Computing Applications (IJHPCA)*, January 11 2016. LLNL-JRNL-663434.
- [23] **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).
- [24] 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).
- [25] 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.
- [26] 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'15)*, Hyderabad, INDIA, May 25-29 2015. LLNL-CONF-663150, (21.8% accepted).
- [27] 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)*, 27(3):829–840, March 2015.

- [28] 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.
- [29] 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).
- [30] 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).
- [31] 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).
- [32] 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).
- [33] 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.
- [34] 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 Language Design and Implementation (PLDI'14)*, Edinburgh, UK, June 9-11 2014. LLNL-CONF-646258, (18% accepted).
- Best Paper** [35] 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. LLNL-CONF-645876, (19% accepted).
- [36] 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.
- [37] 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).
- [38] 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).
- [39] 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** [40] 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).
- [41] 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).
- [42] 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.
- [43] 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).

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- [63] Mario Melara, **Todd Gamblin**, Gregory Becker, Robert French, Matt Belhorn, Kelly Thompson, Peter Scheibel, and Rebecca Hartman-Baker. Using Spack to Manage Software on Cray Supercomputers. In *Cray Users Group (CUG 2017)*, Seattle, WA, May 7-11 2017.
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- [65] Benafsh Husain, Alfredo Giménez, Joshua A. Levine, **Todd Gamblin**, and Peer-Timo Bremer. Relating memory performance data to application domain data using an integration API. In *Workshop on Visual Performance Analytics (VPA'16)*, Salt Lake City, UT, November 13 2016.
- [66] Huu Tan Nguyen, Abhinav Bhatele, Peer-Timo Bremer, **Todd Gamblin**, Martin Schulz, Lai Wei, David Boehme, and Kwan-Liu Ma. VIPACT: A Visualization Interface for Analyzing Calling Context Trees. In *Workshop on Visual Performance Analytics (VPA'16)*, Salt Lake City, UT, November 13 2016.
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- [84] Adam J. Stewart, Massimiliano Culp, Gregory Becker, Peter Scheibel, and **Todd Gamblin**. Spack Community BoF. In *Supercomputing 2019*, Denver, CO, November 21 2019.
- [85] **Todd Gamblin**, Gregory Becker, Massimiliano Culp, Mario Melara, Peter Scheibel, and Adam J. Stewart. Tutorial: Managing HPC Software Complexity with Spack. In *Supercomputing 2019*, Denver, CO, November 18 2019. Full day.
- [86] Gregory Becker and **Todd Gamblin**. Tutorial: Spack for Developers. In *Los Alamos National Laboratory*, Los Alamos, NM, November 5 2019. Full day.
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- [88] **Todd Gamblin** and Gregory Becker. Spack Tutorial. In *1st Workshop on NSF and DOE High Performance Computing Tools*, Eugene, OR, July 10-11 2019. University of Oregon.
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- [94] **Todd Gamblin**, Gregory Becker, Peter Scheibel, Matt Legendre, and Mario Melara. Tutorial: Managing HPC Software Complexity with Spack. In *Exascale Computing Project 2nd Annual Meeting*, Knoxville, TN, February 6-8 2018. Half day.
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- [102] 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.
- [103] **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.
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### Posters & Presentations

- [106] **Todd Gamblin**. Decluttering HPC Software Chaos with SPACK. In *SIAM Conference on Parallel Processing for Scientific Computing (PP'18)*, Minisymposium on Productive Programming using Parallel Models, Tools and Scientific Workflows, Tokyo, Japan, March 7 2018.
- [107] **Todd Gamblin**. Spack State of the Union. In *Exascale Computing Project 2nd Annual Meeting*, Knoxville, TN, February 6-8, 2018 2018. LLNL-PRES-746210.
- [108] **Todd Gamblin**. Binary packaging for HPC with Spack. In *Free and Open source Software Developers' European Meeting (FOSDEM'18)*, Brussels, Belgium, February 4 2018. LLNL-PRES-745747.
- [109] **Todd Gamblin**. How compilers affect dependency resolution in Spack. In *Free and Open source Software Developers' European Meeting (FOSDEM'18)*, Brussels, Belgium, February 3 2018. LLNL-PRES-745770.
- [110] **Todd Gamblin**. Recent developments in Spack. In *Easybuild User Meeting*, Amsterdam, The Netherlands, January 30 2018.
- [111] David A. Beckingsale, Olga Pearce, and **Todd Gamblin**. Lightweight, Reusable Models for Dynamically Tuning Data-Dependent Code. In *Supercomputing 2016 (SC'16)*, Salt Lake City, UT, November 13-18 2016.
- [112] Olga Pearce, **Todd Gamblin**, Bronis de Supinski, Martin Schulz, and Nancy M. Amato. Decoupled load balancing. In *Symposium on Principles and Practices of Parallel Programming (PPoPP'15)*, San Francisco, CA, February 7-11 2015.
- [113] John Gyllenhaal, **Todd Gamblin**, Adam Bertsch, and Roy Musselman. Enabling High Job Throughput for Uncertainty Quantification on BG/Q. In *IBM HPC Systems Scientific Computing User Group (ScicomP'14)*, Chicago, IL, 2014.

- [114] Koji Inoue, Yuki Abe, Yuichi Inadomi, Kate Isaacs, **Todd Gamblin**, and Martin Schulz. NsimPower: Large Scale Interconnection Network Simulator for Power/Performance Analysis. In *JST/CREST International Symposium on Post Petascale System Software (ISP2S2)*, Kobe, Japan, December 2-4 2014.
- [115] Katherine E. Isaacs, **Todd Gamblin**, Abhinav Bhatele, Peer-Timo Bremer, Martin Schulz, and Bernd Hamann. Extracting logical structure and identifying stragglers in parallel execution traces. In *ACM SIGPLAN Symposium on Principles and Practices of Parallel Programming (PPoPP'14)*, Orlando, FL, February 15-19 2014. LLNL-ABS-647655.
- [116] Anshu Arya, **Todd Gamblin**, Bronis R. de Supinski, and Laxmikant V. Kale. Evaluating topology mapping via graph partitioning. In *Supercomputing 2012 (SC'12)*, Salt Lake City, UT, November 10-16 2012. LLNL-POST-491398.
- [117] Katherine E. Isaacs, Aaditya G. Landge, **Todd Gamblin**, Peer-Timo Bremer, Valerio Pascucci, and Bernd Hamann. Exploring performance data with boxfish. In *Supercomputing 2012 (SC'12)*, Salt Lake City, UT, November 10-16 2012.
- [118] Vivek Kale, **Todd Gamblin**, Torsten Hoeffler, Bronis R. de Supinski, and William Gropp. Slack-conscious lightweight loop scheduling for scaling past the noise amplification problem. In *Supercomputing 2012 (SC'12)*, Salt Lake City, UT, November 10-16 2012.
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- [126] **Todd Gamblin**. Load Balance Analysis with Libra. In *Proceedings of the Dagstuhl Seminar on Program Development for Extreme-Scale Computing*, Dagstuhl, Germany, May 3-7 2010. LLNL-PRES-431860.
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- [130] **Todd Gamblin**, Bronis R. de Supinski, Martin Schulz, Robert J. Fowler, and Daniel A. Reed. System-wide performance equivalence class detection using clustering. In *Supercomputing 2008 (SC'08)*, Austin, TX, November 15-21 2008. LLNL-POST-408815.
- [131] **Todd Gamblin**, Bronis R. de Supinski, Martin Schulz, Robert J. Fowler, and Daniel A. Reed. Scalable Load Balance Measurement Using Wavelets. In *The Salishan Conference on High-Speed Computing*, Gleneden Beach, OR, April 21-24 2008. LLNL-POST-463395.
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- [133] **Todd Gamblin**, Prasun Ratn, Bronis R. de Supinski, Martin Schulz, Frank Mueller, Robert J. Fowler, and Daniel A. Reed. An open framework for scalable, reconfigurable performance analysis. In *Supercomputing 2007 (SC'07)*, Reno, NV, November 10-16 2007. UCRL-POST-236200.
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