

# Torsten Hoefler

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## Education

- 2005–2008 **Ph.D., Computer Science (Dr. rer. nat.)**, *Indiana University, USA*,  
GPA: 4.0/4.0 (“summa cum laude”).  
Committee: [Andrew Lumsdaine](#), Randall Bramley, Jack Dongarra, Richard Graham, Minaxi Gupta
- 2000–2004 **Diplom, Informatik (Master of CS)**, *Chemnitz University of Technology, Germany*,  
Grade: sehr gut (“very good”) – Universitätspreis 2005 (best student in class of 2005).  
Advisor: Wolfgang Rehm
- 1993–1999 **Gymnasium (Academic High School)**, *Gymnasium Oelsnitz, Germany*,  
Graduated top of class (3<sup>rd</sup> best among 90 students).

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## Awards and Stipends

- 2011 **Best Poster Award PPOPP’11**, Best Poster at the 2011 ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming.
- 2010 **Best Paper Award SC’10**, Best Paper at ACM/IEEE Supercomputing 2010, \$1,000.
- 2010 **Best Paper Award LSAP’10**, Best Paper at the 2010 ACM Workshop on Large-Scale System and Application Performance.
- 2008 **Best Paper Award LCI’09**, Best Student Paper at the Linux Cluster Institute Conference 2009, \$500.
- 2008 **Cluster Challenge Champion SC’08**, Co-advised the winning team at IEEE/ACM SC08’s Cluster Challenge.
- 2008 **Travel Award CCGrid’08**, IEEE/TCSC Doctoral Symposium for Cluster Computing and the Grid 2008, \$2,000.
- 2007–2008 **Fellowship for Doctoral Studies**, Indiana University and Cisco Systems (full tuition and stipend at IU).
- 2005 **State Fellowship for Doctoral Studies**, Saxon Ministry of Science and the Fine Arts (Sächsisches Ministerium für Wissenschaft und Kunst - SMWK), one of four reputable fellowships at TU Chemnitz, €1,400/month, (Extension declined after one year.).
- 2005 **Universitätspreis 2005 (Best Student Award)**, Chemnitz University of Technology, €2,000.
- 2005 **PARS Nachwuchspreis 2005 (PARS Junior Researcher Award)**, Group of Parallel Algorithms, Computer Architectures and System Software in the German Computer Society (Gesellschaft für Informatik, GI), €500.

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## External Funding

- 2010–2013 **Compiled MPI: Cost-Effective Exascale Application Development**, *UI’s share: \$165,000; funded under DOE X-Stack; in Collaboration with Daniel Quinlan, Greg Bronevetsky (LLNL), and Andrew Lumsdaine (IU), US Department of Energy.*

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2005 **Quantum Mechanical Computations**, €55,000; *Individual Funding*, AMD Saxony.

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## Positions and Experience

### Research

- 2010–present **Application and System Performance Modeling and Simulation Lead**, Blue Waters Directorate, NCSA, University of Illinois at Urbana-Champaign, USA. .  
Modelling and Simulation of Sustained Petaflop Applications for Blue Waters, MPI Forum Activities. Scientific advisors: Marc Snir, Bill Gropp.
- 2008–2010 **Postdoctoral Fellow**, Open Systems Lab, Indiana University, USA, Parallel Programming, Modelling and Network Research, MPI Forum Activities.  
Scientific advisor: Andrew Lumsdaine.
- 2006–2008 **Research Assistant**, Open Systems Lab, Indiana University, USA.  
Parallel Computing and Networking Research
- Jan 2007 **Visiting Researcher**, Commissariat à l'Énergie Atomique, Direction des Applications Militaires (CEA-DAM), France.  
Parallel Quantum-Mechanical Computations with ABINIT
- Dec 2005 **Visiting Researcher**, CINECA Consorzio Interuniversitario, Italy.  
Parallel Ab-Initio Quantum Mechanical Computations
- 2004–2006 **Research Assistant**, Chemnitz University of Technology, Germany.  
Parallel Ab-Initio Quantum Mechanical Computations, Networking Research

### Teaching/Advising

- 2011 **Professor**, University of Illinois at Urbana-Champaign, Teaching Class CS498.  
Hot Topics in HPC: Networks and Fault tolerance (4cr Grad./3cr Undergrad., with F. Cappello)
- 2009 **Advisor**, Indiana University.  
Advised various Master Students Research Projects
- 2008 **IEEE/ACM Supercomputing 2008 Cluster Challenge**, Indiana University.  
Preparing (the winning) IU/TUD team of undergraduate students for the challenge at SC'08.
- 2007 **IEEE/ACM Supercomputing 2007 Cluster Challenge**, Indiana University.  
Preparing the IU team of undergraduate students for the challenge at SC'07.
- 2005–2006 **Advisor**, University of Technology Chemnitz.  
Advised eight Master Students (“Diplomarbeiten”)
- 2002–2004 **Teaching Assistant**, University of Technology Chemnitz.  
Tutoring Students and Grading Exams
- 2002–2005 **Tutor**, Promind GmbH Chemnitz.  
Advanced Vocational Training

### Engineering

- 2000–2005 **Software Engineer**, DELTA proveris AG.  
Design and Implementation of Database and Web Applications

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## Languages

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German	<b>native language</b>
English	<b>fluent</b>
Latin	<b>basic (Latinum)</b>
Russian	<b>beginner</b>

## Peer-reviewed Conference Publications

- SC11** T. Hoefler, W. Gropp, M. Snir, and W. Kramer Performance Modeling for Systematic Performance Tuning *Sep. 2011, Accepted at ACM/IEEE Supercomputing 2011*
- EuroMPI'11** W. Gropp, T. Hoefler, R. Thakur, and J. L. Traeff Performance Expectations and Guidelines for MPI Derived Datatypes *Sep. 2011, Accepted at the EuroMPI 2011 Conference*
- EuroMPI'11** V. Venkatesan, M. Chaarawi, E. Gabriel, and T. Hoefler. Design and Evaluation of Nonblocking Collective I/O Operations *Sep. 2011, Accepted at the EuroMPI 2011 Conference*
- EuroMPI'11** T. Hoefler, and M. Snir. Writing Parallel Libraries with MPI - Common Practice, Issues, and Extensions *Sep. 2011, Keynote Paper at the IMUDI session at EuroMPI 2011 Conference*
- EuroPar'11** T. Schneider, S. Eckelmann, T. Hoefler, and W. Rehm. Kernel-Based Offload of Collective Operations - Implementation, Evaluation and Lessons Learned. *Aug. 2011, Accepted at the EuroPar 2011 Conference (acceptance rate 29.9%, 81/271)*
- ICS'11** T. Hoefler and M. Snir. Generic Topology Mapping Strategies for Large-scale Parallel Architectures. *Jun. 2011, Accepted at the 25th ACM International Conference on Supercomputing 2011 (acceptance rate 21.7%, 35/161)*
- ICS'11** J. Willcock, T. Hoefler, N. Edmonds, and A. Lumsdaine. Active Pebbles: Parallel Programming for Data-Driven Applications. *Jun. 2011, Accepted at the 25th ACM International Conference on Supercomputing 2011 (acceptance rate 21.7%, 35/161)*
- IPDPS'11** J. Domke, T. Hoefler, and W. Nagel. Deadlock-Free Oblivious Routing for Arbitrary Topologies. *May. 2011. Accepted at the 25th IEEE International Parallel & Distributed Processing Symposium. (acceptance rate: 19.6%, 112/571)*
- PPoPP'11** J. Willcock, T. Hoefler, N. Edmonds, and A. Lumsdaine. Active Pebbles: A Programming Model For Highly Parallel Fine-Grained Data-Driven Computations. *Jan. 2011. Accepted at the 2011 ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming (PPoPP'11) **Best Poster at PPOPP'11** (acceptance rate: 25%, 26/165 papers + 16/165 poster).*
- PADL'11** E. Holk, W. E. Byrd, J. Willcock, T. Hoefler, A. Chauhan, and A. Lumsdaine. Kanor – A Declarative Language for Explicit Communication. *Jan. 2011. Accepted at the Thirteenth International Symposium on Practical Aspects of Declarative Languages (PADL'11).*
- HiPC'10** N. Edmonds, J. Willcock, T. Hoefler, and A. Lumsdaine. Design of a Large-Scale Hybrid-Parallel Graph Library. *Dec. 2010. Accepted at the 2010 International Conference on High Performance Computing (HiPC'10), Student Research Symposium.*
- HiPC'10** N. Edmonds, T. Hoefler, and A. Lumsdaine. A Space-Efficient Parallel Algorithm for Computing Betweenness Centrality in Distributed Memory. *Dec. 2010. Accepted at the 2010 International Conference on High Performance Computing (HiPC'10). (acceptance rate: 19.2%)*

- SC'10** T. Hoefler, T. Schneider, and A. Lumsdaine. Characterizing the Influence of System Noise on Large-Scale Applications by Simulation. *International Conference for High Performance Computing, Networking, Storage and Analysis (SC'10)*, Nov. 2010. **Best Paper at SC10**, (acceptance rate: 19.8%, 50/253)
- PACT'10** J. Willcock, T. Hoefler, N. Edmonds, and A. Lumsdaine. AM++: A Generalized Active Message Framework. *Sep. 2010. Accepted at The Nineteenth International Conference on Parallel Architectures and Compilation Techniques (PACT'10)*. (acceptance rate: 17%, 46/266)
- EuroMPI'10** T. Hoefler, G. Bronevetsky, B. Barrett, B. R. de Supinski, and A. Lumsdaine. Efficient MPI Support for Advanced Hybrid Programming Models. *Sep. 2010. Accepted at the 17th European MPI Users Group conference (EuroMPI'10)*.
- EuroMPI'10** T. Hoefler, W. Gropp, R. Thakur, and J. L. Traeff. Toward Performance Models of MPI Implementations for Understanding Application Scaling Issues. *Sep. 2010. Accepted at the 17th European MPI Users Group conference (EuroMPI'10)*.
- EuroMPI'10** T. Hoefler and S. Gottlieb. Parallel Zero-Copy Algorithms for Fast Fourier Transform and Conjugate Gradient using MPI Datatypes. *Sep. 2010. Accepted at the 17th European MPI Users Group conference (EuroMPI'10)*.
- HotI'10** B. Arimilli, R. Arimilli, V. Chung, S. Clark, W. Denzel, B. Drerup, T. Hoefler, J. Joyner, J. Lewis, J. Li, N. Ni, and R. Rajamony. The PERCS High-Performance Interconnect. *Proceedings of 18th Symposium on High-Performance Interconnects (Hot Interconnects 2010)*. *IEEE*, Aug. 2010. (invited paper)
- PPoPP'10** T. Hoefler, C. Siebert, and A. Lumsdaine. Scalable Communication Protocols for Dynamic Sparse Data Exchange. *Proceedings of the 2010 ACM SIGPLAN Symposium on Principles and Practice of Parallel Programming*, pages 159–168. *ACM*, Jan. 2010. (acceptance rate: 16.8%, 29/173)
- HiPC'09** P. Kambadur, A. Gupta, T. Hoefler, and A. Lumsdaine. Demand-driven Execution of Static Directed Acyclic Graphs Using Task Parallelism. *Dec. 2009. Accepted at the 2009 International Conference on High Performance Computing, HiPC'09*. (acceptance rate: 11%, 35/320)
- HotI'09** T. Hoefler, T. Schneider, and A. Lumsdaine. Optimized Routing for Large-Scale InfiniBand Networks. *17th Annual IEEE Symposium on High Performance Interconnects, HOTI'09*, *IEEE Computer Society*, Aug. 2009. (acceptance rate: 30%, 14/47)
- ICPP'09** T. Hoefler, C. Siebert, and A. Lumsdaine. Group Operation Assembly Language - A Flexible Way to Express Collective Communication *ICPP-2009 - The 38th International Conference on Parallel Processing*. *IEEE*, Sep. 2009. (acceptance rate: 32%, 71/220)
- EuroMPI'09** T. Hoefler, A. Lumsdaine, and J. Dongarra. Towards Efficient MapReduce Using MPI. *Recent Advances in Parallel Virtual Machine and Message Passing Interface, 16th European PVM/MPI Users' Group Meeting, EuroPVM/MPI'09*. *Springer*, Sep. 2009.
- LCI'09** J. Mueller, T. Schneider, J. Domke, R. Geyer, M. Haesing, T. Hoefler, S. Hoehlig, G. Juckeland A. Lumsdaine, M. Mueller, and W. Nagel. Cluster Challenge 2008: Optimizing Cluster Configuration and Applications to Maximize Power Efficiency. *Proceedings of the 10th LCI International Conference on High-Performance Clustered Computing, LCI'09*, Mar. 2009. **Best Student Paper at LCI'09**
- Cluster'08** T. Hoefler, T. Schneider, and A. Lumsdaine. Multistage Switches are not Crossbars: Effects of Static Routing in High-Performance Networks. *Proceedings of the 2008 IEEE International Conference on Cluster Computing, CLUSTER'08*. *IEEE Computer Society*, Oct. 2008. (acceptance rate: 30%, 28/92)

- Cluster'08** T. Hoefler and A. Lumsdaine. Message Progression in Parallel Computing - To Thread or not to Thread? *Proceedings of the 2008 IEEE International Conference on Cluster Computing, CLUSTER'08*. IEEE Computer Society, Oct. 2008. (acceptance rate: 30%, 28/92)
- EuroMPI'08** T. Hoefler, M. Schellmann, S. Gorchak, and A. Lumsdaine. Communication Optimization for Medical Image Reconstruction Algorithms. *Recent Advances in Parallel Virtual Machine and Message Passing Interface, 15th European PVM/MPI Users' Group Meeting, EuroPVM/MPI'08*, volume LNCS 5205, pages 75–83. Springer, Sep. 2008.
- EuroMPI'08** T. Hoefler, F. Lorenzen, and A. Lumsdaine. Sparse Non-Blocking Collectives in Quantum Mechanical Calculations. *Recent Advances in Parallel Virtual Machine and Message Passing Interface, 15th European PVM/MPI Users' Group Meeting, EuroPVM/MPI'08*, volume LNCS 5205, pages 55–63. Springer, Sep. 2008.
- HotI'08** P. Geoffroy and T. Hoefler. Adaptive Routing Strategies for Modern High Performance Networks. *16th Annual IEEE Symposium on High Performance Interconnects, HOTI'08*, pages 165–172. IEEE Computer Society, Aug. 2008. (acceptance rate: 30%, 14/47)
- SPAA'08** T. Hoefler, P. Gottschling, and A. Lumsdaine. Leveraging Non-blocking Collective Communication in High-performance Applications. *Proceedings of the Twentieth Annual Symposium on Parallelism in Algorithms and Architectures, SPAA'08*, pages 113–115. Association for Computing Machinery (ACM), Jun. 2008. (acceptance rate: 28%, 36/128)
- CCGrid'08** T. Hoefler and A. Lumsdaine. Overlapping Communication and Computation with High Level Communication Routines. *Proceedings of the 8th IEEE Symposium on Cluster Computing and the Grid, CCGrid'08*, May 2008. (acceptance rate: 32%)
- SC'07** T. Hoefler, A. Lumsdaine, and W. Rehm. Implementation and Performance Analysis of Non-Blocking Collective Operations for MPI. *In proceedings of the 2007 International Conference on High Performance Computing, Networking, Storage and Analysis, SC07*. IEEE Computer Society/ACM, Nov. 2007. (acceptance rate: 20%, 54/268)
- EuroMPI'07** T. Hoefler, P. Kambadur, R. L. Graham, G. Shipman, and A. Lumsdaine. A Case for Standard Non-Blocking Collective Operations. *Recent Advances in Parallel Virtual Machine and Message Passing Interface, EuroPVM/MPI'07*, volume 4757, pages 125–134. Springer, Oct. 2007.
- HPCC'07** T. Hoefler, T. Mehlan, A. Lumsdaine, and W. Rehm. Netgauge: A Network Performance Measurement Framework. *Proceedings of High Performance Computing and Communications, HPCC'07*, volume 4782, pages 659–671. Springer, Sep. 2007.
- EuroMPI'06** T. Hoefler, P. Gottschling, W. Rehm, and A. Lumsdaine. Optimizing a Conjugate Gradient Solver with Non-Blocking Collective Operations. *Proceedings of Recent Advantages in Parallel Virtual Machine and Message Passing Interface, EuroPVM/MPI'06*, pages 374–382. Springer, Sep. 2006.
- PARELEC'06** T. Hoefler, C. Viertel, T. Mehlan, F. Mietke, and W. Rehm. Assessing Single-Message and Multi-Node Communication Performance of InfiniBand. *Proceedings of IEEE International Conference on Parallel Computing in Electrical Engineering (PARELEC'06)*, pages 227–232. IEEE Computer Society, Sep. 2006.
- PARELEC'06** T. Mehlan, J. Strunk, T. Hoefler, F. Mietke, and W. Rehm. IRS - A portable Interface for Reconfigurable Systems. *Proceedings of IEEE International Conference on Parallel Computing in Electrical Engineering, (PARELEC'06)*, pages 187–191. IEEE Computer Society, Sep. 2006.

- EuroPar'06** F. Mietke, R. Baumgartl, R. Rex, T. Mehlan, T. Hoefler, and W. Rehm. Analysis of the Memory Registration Process in the Mellanox InfiniBand Software Stack. *Proceedings of Euro-Par 2006 Parallel Processing*, pages 124–133. Springer-Verlag Berlin, Aug. 2006. (acceptance rate: 37.9%, 110/290)

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## Edited Journals

- PARCO'12** T. Hoefler (Editor). Extensions for Next-Generation Parallel Programming Models. *Elsevier Parallel Computing*, Jan/Feb. 2012.

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## Journal Publications and Book Chapters

- PPL'11** P. Balaji, D. Buntinas, D. Goodell, W. Gropp, T. Hoefler, S. Kumar, E. Lusk, R. Thakur, and J. L. Traeff. MPI on Millions of Cores. *Parallel Processing Letters (PPL)*, Mar. 2011.
- CiSE'10** T. Hoefler. Software and Hardware Techniques for Power-Efficient HPC Networking. *Computing in Science and Engineering (CiSE)*, Dec. 2010.
- CCPE'10** T. Hoefler, R. Rabenseifner, H. Ritzdorf, B. R. de Supinski, R. Thakur, , and J. L. Traeff. The Scalable Process Topology Interface of MPI 2.2. *Concurrency and Computation: Practice and Experience*, Dec. 2010.
- IJPEDS'10** T. Hoefler, T. Schneider, and A. Lumsdaine. Accurately Measuring Overhead, Communication Time and Progression of Blocking and Nonblocking Collective Operations at Massive Scale. *International Journal of Parallel, Emergent and Distributed Systems*, 25(4):241–258, Jul. 2010.
- MPI-2.2 Standard** The MPI Forum. MPI: A Message-Passing Interface Standard, Version 2.2. *Technical report, MPI Forum, 2009. (Chapters 5 (Collective Operations) and 7 (Process Topologies))*.
- PPL'09** T. Hoefler, T. Schneider, and A. Lumsdaine. The Effect of Network Noise on Large-Scale Collective Communications. *Parallel Processing Letters (PPL)*, 19(4):573–593, Aug. 2009.
- SIMPAT'09** T. Hoefler, T. Schneider, and A. Lumsdaine. LogGP in Theory and Practice - An In-depth Analysis of Modern Interconnection Networks and Benchmarking Methods for Collective Operations. *Elsevier Journal of Simulation Modelling Practice and Theory (SIMPAT)*, Jun. 2009.
- PARCO'07** T. Hoefler, P. Gottschling, A. Lumsdaine, and W. Rehm. Optimizing a Conjugate Gradient Solver with Non-Blocking Collective Operations. *Elsevier Journal of Parallel Computing (PARCO)*, 33(9):624–633, Sep. 2007.
- HPC-Europa** T. Hoefler, R. Janisch, and W. Rehm. Improving the parallel scaling of ABINIT. *Science and Supercomputing in Europe*, pages 551–559. CINECA Conzorzio Interuniversitario, Dec. 2005.
- Book Chapter** T. Hoefler, R. Janisch, and W. Rehm. A Performance Analysis of ABINIT on a Cluster System. *Parallel Algorithms and Cluster Computing*, pages 37–51. Springer, *Lecture Notes in Computational Science and Engineering*, Dec. 2005.

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## Peer-reviewed Workshop Publications

- LSAP'11** T. Hoefler and M. Snir. Performance Engineering: A Must for Petaflops and Beyond. *Proceedings of Workshop on Large-Scale System and Application Performance (LSAP 2011)*. **Keynote Paper**

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- PROPER'10** T. Hoefler. Bridging Performance Analysis Tools and Analytic Performance Modeling for HPC. *Proceedings of Workshop on Productivity and Performance (PROPER 2010)*. Springer, Dec. 2010. **Keynote Paper**
- LSAP'10** T. Hoefler, T. Schneider, and A. Lumsdaine. LogGOPSim - Simulating Large-Scale Applications in the LogGOPS Model. Jun. 2010. Accepted at the ACM Workshop on Large-Scale System and Application Performance (LSAP 2010). **Best Paper at LSAP'10**
- AMP'10** T. Hoefler, J. Willcock, A. Chauhan, and A. Lumsdaine. The Case for Collective Pattern Specification. Jun. 2010. Accepted at the 1st ACM Workshop on Advances in Message Passing (AMP'10).
- HIPS'09** T. Hoefler and J. L. Traeff. Sparse Collective Operations for MPI. *Proceedings of the 23rd IEEE International Parallel & Distributed Processing Symposium, HIPS'09 Workshop, May 2009*.
- LSPP'09** T. Hoefler, T. Schneider, and A. Lumsdaine. The Impact of Network Noise at Large-Scale Communication Performance. *Proceedings of the 23rd IEEE International Parallel & Distributed Processing Symposium, LSPP'09 Workshop, May 2009*.
- CAC'09** C. Kaiser, T. Hoefler, B. Bierbaum, and T. Bemberl. Implementation and Analysis of Non-blocking Collective Operations on SCI Networks. *Proceedings of the 23rd IEEE International Parallel & Distributed Processing Symposium, CAC'09 Workshop, May 2009*.
- CAC'09** T. Hoefler, T. Schneider, and A. Lumsdaine. A Power-Aware, Application-Based, Performance Study Of Modern Commodity Cluster Interconnection Networks. *Proceedings of the 23rd IEEE International Parallel & Distributed Processing Symposium, CAC'09 Workshop, May 2009*.
- PMEO'08** T. Hoefler, T. Schneider, and A. Lumsdaine. Accurately Measuring Collective Operations at Massive Scale. *Proceedings of the 22nd IEEE International Parallel & Distributed Processing Symposium, PMEO'08 Workshop, Apr. 2008*.
- CAC'08** T. Hoefler and A. Lumsdaine. Optimizing non-blocking Collective Operations for InfiniBand. *Proceedings of the 22nd IEEE International Parallel & Distributed Processing Symposium, CAC'08 Workshop, Apr. 2008*.
- PASA'08** T. Schneider, T. Hoefler, S. Wunderlich, T. Mehlan, and W. Rehm. An optimized ZGEMM implementation for the Cell BE. *Proceedings of the 9th Workshop on Parallel Systems and Algorithms (PASA), Feb. 2008*.
- PMEO'07** T. Hoefler, A. Lichei, and W. Rehm. Low-Overhead LogGP Parameter Assessment for Modern Interconnection Networks. *Proceedings of the 21st IEEE International Parallel & Distributed Processing Symposium, PMEO'07 Workshop. IEEE Computer Society, Mar. 2007*.
- CAC'07** T. Hoefler, C. Siebert, and W. Rehm. A practically constant-time MPI Broadcast Algorithm for large-scale InfiniBand Clusters with Multicast. *Proceedings of the 21st IEEE International Parallel & Distributed Processing Symposium, CAC'07 Workshop, page 232. IEEE Computer Society, Mar. 2007*.
- FHPCN'06** T. Hoefler, J. Squyres, W. Rehm, and A. Lumsdaine. A Case for Non-Blocking Collective Operations. *Frontiers of High Performance Computing and Networking - ISPA'06 Workshops, volume 4331/2006, pages 155–164. Springer Berlin / Heidelberg, Dec. 2006*.
- HPCNano'06** T. Hoefler, R. Janisch, and W. Rehm. Parallel scaling of Teter's minimization for Ab Initio calculations. Nov. 2006. Presented at the workshop HPC Nano in conjunction with the IEEE international conference on Supercomputing (SC'06).
- DAPSYS'06** T. Hoefler, J. Squyres, G. Fagg, G. Bosilca, W. Rehm, and A. Lumsdaine. A New Approach to MPI Collective Communication Implementations. *Distributed and Parallel Systems (DAPSYS'06) - From Cluster to Grid Computing, pages 45–54. Springer, Sep. 2006*.

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- CAC'06** T. Hoefler, T. Mehlan, F. Mietke, and W. Rehm. Fast Barrier Synchronization for InfiniBand. *Proceedings of the 20th IEEE International Parallel & Distributed Processing Symposium, CAC'06 Workshop, Apr. 2006.*
- PMEO'06** T. Hoefler, T. Mehlan, F. Mietke, and W. Rehm. LogfP - A Model for small Messages in InfiniBand. *Proceedings of the 20th IEEE International Parallel & Distributed Processing Symposium, PME0-PDS'06 Workshop, Apr. 2006.*
- ICPPW'05** T. Hoefler, L. Cerquetti, T. Mehlan, F. Mietke, and W. Rehm. A practical approach to the rating of barrier algorithms using the LogP model and Open-MPI. *Proceedings of the 2005 International Conference on Parallel Processing Workshops (ICPP'05), pages 562–569, Jun. 2005.*
- PARS'05** T. Hoefler and W. Rehm. A Communication Model for Small Messages with InfiniBand. *PARS Mitteilungen (German), pages 32–41. PARS, Jun. 2005. Received PARS Junior Researcher Award.*

## Selected Invited Talks

- Keynote EuroMPI'11 **Writing Parallel Libraries with MPI - The Good, the Bad, and the Ugly**, Keynote talk at 18th European PVM/MPI User's Group Meeting (EuroMPI 2011), Santorini, Greece.
- Keynote EnA-HPC'11 **Energy-aware Software Development for Massive-Scale Systems**, Keynote at the International Conference on Energy-Aware High Performance Computing (EnA-HPC'11), Hamburg, Germany.
- Jülich 2011 **Model-Driven, Performance-Centric HPC Software and System Design and Optimization**, Jülich Supercomputing Center, Apr. 2011, Jülich, Germany.
- Keynote PROPER'10 **Analytical Performance Modeling and Simulation for Blue Waters**, Keynote at the Workshop on Productivity and Performance (PROPER 2010) in conjunction with EuroPar 2010, Aug. 2010, Ischia, Italy.
- Argonne Natl. Laboratory **Nonblocking and Sparse Collective Operations on Petascale Computers**, Argonne National Laboratory, Jun. 2010, Chicago, IL, USA.
- SC'09 BoF **Selected MPI-2.2 and MPI-3 Features**, MPICH Birds of a Feather, Nov. 2009, Portland, OR, USA.
- TU Munich **Improving Parallel Computing Platforms**, Technical University of Munich, Sep. 2010, Munich, Germany.
- Cisco Systems **The Effects of Common Communication Patterns in Large-Scale Networks with Switch-Based Static Routing**, Nerd Lunch at Cisco Systems, Aug. 2008, San Jose, CA, USA.
- Berkeley Natl. Laboratory **Multistage Interconnection Networks are not Crossbars**, Lawrence Berkeley National Laboratory, Aug. 2008, Berkeley, CA, USA.
- Livermore Natl. Laboratory **Non-blocking Collective Operations for MPI**, Lawrence Livermore National Laboratory, Aug. 2008, Livermore, CA, USA.
- TU Muenster **Towards Coordinated Optimization of Computation and Communication in Parallel Applications**, Jun. 2008, Fakultät fuer Informatik, Universität Münster, Münster, Germany.
- NEC Europe **Accurately Measuring Collective Operations at Massive Scale**, C&C Research Laboratories, NEC Europe Ltd., Dec. 2007, Sankt Augustin, Germany.

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- HLRS **Non-blocking Collectives for MPI-2**, *High Performance Computing Center Stuttgart (HLRS)*, Dec. 2007, Stuttgart, Germany.
- CEA-DAM **Application Optimization with non-blocking Collectives**, *Commissariat a l'Energie Atomique - Direction des applications militaires*, Jan. 2007, Bruyeres-le-chatel, France.
- ABINIT Workshop **Optimization of a parallel 3d-FFT with non-blocking Collective Operations**, *Invited to the 3rd International ABINIT Developer Workshop*, Jan. 2007, Liege, Belgium.
- TU Munich **Fast Barrier Synchronization for InfiniBand**, *Technical University of Munich*, Sep. 2005, Munich, Germany.

## Service

### Chairman

- MPI Forum **MPI Forum Meetings**, *MPI-3 Working Group for Collective Operations and Topology*.
- Hotl'12 **Hot Interconnects 2012**, *Program Chair*.
- SC'12 **IEEE/ACM Supercomputing 2012**, *Technical Posters Chair*.
- HIPS'11 **16th International Workshop on High-Level Parallel Programming Models and Supportive Environments (HIPS'11)**, *General Chair*.
- ROSS'11 **International Workshop on Runtime and Operating Systems for Supercomputers (ROSS'11)**, *General Co-Chair*.
- Hotl'11 **Hot Interconnects 2011**, *Program Co-Chair*.
- Hotl'10 **Hot Interconnects 2010**, *Tutorials Chair*.

### Standardization Committees

- 2010–present **MPI Forum**, *Representing University of Illinois at Urbana-Champaign, Chair of the Collective Operations and Topology Working Group for MPI-3*.
- 2007–2010 **MPI Forum**, *Representing Indiana University, Chair of the Collective Operations Working Group, Co-Author of the Chapter 5 (Collective Communication) and Chapter 7 (Process Topologies) in MPI-2.2*.

### Advisory Service

- 2011 **NSF Review Panel**, *National Science Foundation, Washington, DC*, (reviewing grant proposals asking for  $\approx$ \$500.000 per proposal).
- 2010 **Scientific Software Innovation Institute for Quantum Chemistry**, *Exploratory Workshop, National Science Foundation, Washington, DC*.
- 2010 **Scientific Software Innovation Institute for Parallel Tools**, *Exploratory Workshop, National Science Foundation, Washington, DC*.

### Technical Program Committee Member (alphabetically)

- AMP/PLDI **Advances in Message Passing**, 2010.
- CACHES/ICS **Characterizing Applications for Heterogeneous Exascale Systems**, 2011.
- AsHES/IPDPS **Accelerators and Heterogeneous Exascale Systems**, 2012.
- CASS/IPDPS **Comm. Architecture for Scalable Systems (formerly CAC)**, 2010, 2011, 2012.
- CCGrid **IEEE Symposium on Cluster Computing and the Grid**, 2009, 2010, 2011, 2012.

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Cluster	<b>IEEE Conference on Cluster Computing, 2010, 2012.</b>
ESPAS/HiPEAC	<b>Extreme Scale Parallel Architectures and Systems, 2012.</b>
EuroMPI	<b>former EuroPVM/MPI, 2009, 2010, 2011, 2012.</b>
HiPC	<b>High Performance Computing Conference, 2011,2012.</b>
HIPS/IPDPS	<b>High-Level Par. Programming Models and Supportive Environments, 2011, 2012.</b>
HotI	<b>IEEE Hot Interconnects, 2009, 2010, 2011. 2012.</b>
HPCC	<b>High Performance Computing and Communications, 2011,2012.</b>
ICPP	<b>Intl. Conference on Parallel Processing, 2012.</b>
ICS	<b>ACM International Conference on Supercomputing, 2011.</b>
IPDPS	<b>IEEE Intl. Parallel &amp; Distributed Processing Symposium, 2010.</b>
P2S2/ICPP	<b>Par. Progr. Models and Systems Software for High-End Comp., 2010, 2011, 2012.</b>
PPoPP	<b>Symposium on Principles and Practice of Parallel Programming, 2012 (ERC).</b>
SC	<b>ACM/IEEE Conference on High Performance Computing, 2010, 2011, 2012.</b>
SC	<b>ACM/IEEE SC Doctoral Showcase Committee, 2012.</b>
UCAA/HPDC	<b>Unconventional Cluster Architectures and Applications, 2011.</b>

### Technical Program Committee Reviewer/Scientific Journal Reviewer

CAC/IPDPS	<b>Communication Architecture for Clusters, 2008.</b>
CCPE	<b>Elsevier Concurrency and Computation: Practice and Experience, 2011.</b>
CISE	<b>IEEE Computing in Science and Engineering, 2010.</b>
Cluster	<b>IEEE Conference on Cluster Computing, 2007, 2008, 2010.</b>
Computer	<b>IEEE Computer, 2009.</b>
Euro-Par	<b>Euro-Par, 2010, 2011.</b>
ICPP	<b>Intl. Conference on Parallel Processing, 2010.</b>
IJHPCA	<b>Intl. Journal of High Performance Computing Applications, 2009.</b>
IJPEDS	<b>Intl. Journal of Parallel, Emergent and Distributed Systems, 2008.</b>
IPDPS	<b>IEEE Intl. Parallel &amp; Distributed Processing Symposium, 2008, 2009, 2010, 2011.</b>
JPDC	<b>Intl. Journal of Parallel and Distributed Computing, 2011.</b>
PGAS	<b>Partitioned Global Address Space Conference, 2011.</b>
SC	<b>ACM/IEEE Conference on High Performance Computing, 2007, 2008, 2009, 2010, 2011, 2012.</b>
SPAA	<b>Symposium on Parallelism in Algorithms and Architectures, 2009.</b>
TPDS	<b>IEEE Transactions on Parallel and Distributed Systems, 2008, 2009.</b>
PARCO	<b>Elsevier Parallel Computing, 2011.</b>

### Organized Workshops

**16th International Workshop on High-Level Parallel Programming Models and Supportive Environments (HIPS'11), Organized in conjunction with IEEE IPDPS'12, Anchorage, AL, 2011.**

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**1st Blue Waters Performance Modeling Workshop**, *Organized a performance modeling workshop with speakers from the Los Alamos National Laboratory for early users of the Blue Waters Petascale system, Urbana, IL, 2010.*

**3rd KiCC Workshop**, *Co-Organized 3rd workshop on Kommunikation in Clusterrechnern und Clusterverbundsystemen, Aachen 2007.*

**2nd KiCC Workshop**, *Co-Organized 2nd workshop on Kommunikation in Clusterrechnern und Clusterverbundsystemen, Chemnitz 2007.*

**1st KiCC Workshop**, *Co-Organized 1st workshop on Kommunikation in Clusterrechnern und Clusterverbundsystemen, Chemnitz 2005.*

## Professional Organizations

**IEEE Computer Society**, *Member.*

**Association for Computing Machinery (ACM)**, *Member.*

**ACM SIGHPC**, *Member.*

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## Projects

### Research Projects

- 2010–present **NSF Blue Waters**, *Sustained Petaflop Computing with the Blue Waters machine. Responsible for Modelling and Simulation of Parallel Petaflop Applications.*
- 2008–2010 **DOE CIFTS**, *Coordinated and Improved Fault Tolerance for High Performance Computing Systems.*
- 2007–2010 **DOE FAST-OS II**, *Forum to Address Scalable Technology for Runtime and Operating Systems.*
- 2005–2006 **CHiC**, *Co-Design and Procurement of the Chemnitzer Hochleistungs-Linux-Cluster, project volume 2.6 + 1.7 Million Euro, 528 diskless InfiniBand nodes, 8.2 TFlop/s (73.4% HPL efficiency) #117 in Top 500 June 2007.*

### Software Projects

- 2008–present **LogGOPSim**, *Network performance simulator using the LogGOPS model.*
- 2006–present **Netgauge**, *Network performance measurement tool (open source).*
- 2008 **ORCS**, *Oblivious Routing Congestion Simulator (completed successfully).*
- 2006–2008 **LibNBC**, *Implementation of Nonblocking Collective Operations (completed successfully).*
- 2006–2008 **Open MPI**, *Open source MPI implementation (contributed to collectives framework).*
- 2005–2006 **ABINIT**, *Quantum mechanical computation software (contributed to parallelization).*

## Collaborators

### Advisors (Ph.D., Postdoctoral)

- 2006–2010 **Andrew Lumsdaine**, (*Indiana University*).
- 2010–present **Marc Snir, William Gropp, William Kramer**, (*University of Illinois at Urbana-Champaign*).

### References

- Prof. Andrew Lumsdaine**, *Indiana University*.
- Prof. Marc Snir**, *University of Illinois at Urbana-Champaign*.
- Prof. William Gropp**, *University of Illinois at Urbana-Champaign*.
- Prof. Steven Gottlieb**, *Indiana University*, (Physics).
- Dr. Bronis de Supinski**, *Lawrence Livermore National Laboratory*.
- Dr. Rajeev Thakur**, *Argonne National Laboratory*.

### Recent Co-authors and Collaborators (alphabetically)

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