Dorian C. Arnold
Curriculum Vitæ

University of New Mexico
Department of Computer Sciences
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Research Interests

High-performance computing • **Middleware & tools** • **Fault-tolerance**, focusing on robust, autonomic systems and services for the effective utilization of large-scale high-performance and cloud computing resources.

Professional Preparation

1994 **AS (math, physics, chemistry)**, *St. John's Junior College*, Belize City, Belize.

1996 **BS summa cum laude (math, computer science)**, *Regis University*, Denver, CO.

1998 **MS (computer science)**, *University of Tennessee*, Knoxville, TN.
Project: "CLUBS: Checkpoint Library for Unix-based Systems." Advisor: Dr. James Plank.

2008 **PhD (computer science)**, *University of Wisconsin*, Madison, WI.
Dissertation: "Reliable, Scalable Tree-based Overlay Networks." Advisor: Dr. Barton Miller.

Appointments

'09 – **Assistant Professor**, *Department of Computer Science*, University of New Mexico.

'13 **Summer Faculty**, *Department of Scalable System Software*, Sandia National Laboratories.

'11 **Affiliate Research Scientist**, *Ultrascale Systems Research Center*, New Mexico Consortium.

'09 – '10 **Visiting Scientist**, *Center for Applied Scientific Computing*, Lawrence Livermore National Lab.

'06 **Technical Scholar**, *Center for Applied Scientific Computing*, Lawrence Livermore National Lab.

'99 – '01 **Research Associate**, *Innovative Computing Laboratory*, University of Tennessee.

Publications

Statistics

(From Harzing's Publish or Perish, based on Google Scholar).

689 **Citations**, *35 references*, 2000 – 2013.

283 **Citations per top 3 most cited articles**.

132 **Citations per most cited article**, *(6 articles cited at least 43 times)*.

49.21 **Citations per year**.

19.69 **Citations per reference**.

12 **H-index**, *12 of my articles have been cited at least 12 times*.

25 **G-index**, *My 25 most cited articles have at least 625 (25^2) cumulative citations.*.

Student advisees are in **green**; student co-advisees are in **yellow**.

Refereed Conference Papers

C1 **Joshua Goehner**, **Dorian Arnold**, Dong Ahn and Gregory Lee, "An Optimal Process Launching Strategy for Extreme Scale Bootstrapping" in *The 11th IEEE International Symposium on Parallel and Distributed Processing with Applications (ISPA-13)*, Melbourne, Australia, July 16–18, 2013.

C2 Rolf Riesen, Kurt Ferreira, Dilma Da Silva, Pierre Lemarinier, **Dorian Arnold** and Patrick G. Bridges, "Alleviating Scalability Issues of Checkpointing Protocols" in *The International Conference on High Performance Computing, Networking, Storage and Analysis (SC '12)*, Salt Lake City, Utah, USA, November, 2012. (Acceptance rate: , 100/472, 21%.)

C3 **Dewan Ibtesham**, **Dorian Arnold**, Kurt Ferreira and Patrick Bridges, "On the Viability of Checkpoint Compression for Extreme Scale Systems" in *The 41st International Conference on Parallel Processing (ICPP '12)*, Pittsburgh, Pennsylvania, USA, September, 2012. (Acceptance rate: 53/187, 28%.)

C4 Kurt Ferreira, Jon Stearley, James H. Laros III, Ron Oldfield, Kevin Pedretti, and Ron Brightwell, Rolf Riesen, Patrick Bridges and **Dorian Arnold**, "Evaluating the Viability of Process Replication Reliability for Exascale Systems" in *International Conference for High Performance Computing, Networking, Storage and Analysis (SC '11)*, Seattle, Washington, November, 2011. (Acceptance rate: 74/352, 21%.)

C5 Kurt Ferreira, Rolf Riesen, Ron Brightwell, Patrick Bridges and **Dorian Arnold**, "Libhashckpt: Hash-based Incremental Checkpointing Using GPU's" in *18th EuroMPI Conference*, Santorini, Greece, September, 2011. (Acceptance rate: 81/271, 29.9%.)

C6 **Dorian Arnold** and Barton Miller, "A Failure Recovery Model for Scalable Data Aggregation," in *24th IEEE International Parallel and Distributed Processing Symposium (IPDPS)*, Atlanta, GA, April 2010. (Acceptance rate: 127/527, 24%.)

C7 Gregory Lee, Dong Ahn, **Dorian Arnold**, Bronis de Supinski, Matthew Legendre, Barton Miller, Martin Schulz and Ben Liblit, "Lessons Learned at 208K: Towards Debugging Millions of Cores," in *2008 ACM/IEEE Conference on Supercomputing (SC '08)*, Austin, TX, November 2008. (Acceptance rate: 59/277, 21.3%.)

C8 Dong Ahn, **Dorian Arnold**, Bronis de Supinski, Gregory Lee, Barton Miller and Martin Schulz, "Overcoming Scalability Challenges for Tool Daemon Launching," in *37th International Conference on Parallel Processing (ICPP-08)*, Portland, OR, September, 2008. (Acceptance rate: 81/263: 30.8%.)

C9 Aroon Nataraj, Allen Malony, Alan Morris, **Dorian Arnold** and Barton Miller, "In Search of Sweet-Spots in Parallel Performance Monitoring", in *IEEE Cluster 2008*, Tsukuba, Japan, September 2008. (Acceptance rate: 28/92: 30.4%.)

C10 **Dorian Arnold**, Dong Ahn, Bronis de Supinski, Gregory Lee, Barton Miller, Martin Schulz, "Stack Trace Analysis for Large Scale Debugging," in *International Parallel and Distributed Processing Symposium*, Long Beach, CA, Mar. 26–30, 2007. (Acceptance rate: 109/419: 26.0%.)

C11 Phillip Roth, **Dorian Arnold**, and Barton Miller, "MRNet: A Software-based Multicast/Reduction Network for Scalable Tools," in *SC 2003*, Phoenix, AZ, Nov. 2003. (Acceptance rate: 60/207: 29.0%.)

C12 Shirley Moore, **Dorian Arnold**, and David Cronk, "Metacomputing Support for the SARA3D Structural Acoustics Application," in *DoD Users' Group Conference*, Biloxi, MS, Jun. 18–21, 2001.

C13 **Dorian Arnold**, Dieter Bachmann, and Jack Dongarra, "Request Sequencing: Optimizing Communication for the Grid," in *6th International Euro-Par Conference – Parallel Processing (Euro-Par 2000)*, Munich, Germany, Sep. 2000, pp. 1213–1222. (Acceptance rate: 167/326: 51.2%.)

C14 **Dorian Arnold** and Jack Dongarra, "Developing an Architecture to Support the Implementation and Development of Scientific Computing Applications," in *The Architecture of Scientific Software (IFIP TC2/WG2.5)*, Ottawa, Canada, Oct. 2000.

C15 **Dorian Arnold**, Susan Blackford, Jack Dongarra, Victor Eijkhout, and Tinghua Xu, "Seamless Access to Adaptive Solver Algorithms," in *16th IMACS WORLD CONGRESS 2000 on Scientific Computation, Applied Mathematics and Simulation*, Aug. 2000. (Also in *SGI Users' Conference*, Oct. 2000, pp. 23–30.)

C16 **Dorian Arnold**, Shirley Browne, Jack Dongarra, Graham Fagg, and Keith Moore, "Secure Remote Access to Numerical Software and Computational Hardware," in *DoD High-Performance Computing Modernization Program Users Group Conference*, Jun. 2000.

C17 **Dorian Arnold**, Wonsuck Lee, Jack Dongarra, and Mary Wheeler, "Providing Infrastructure and Interface to High-Performance Applications in a Distributed Setting," in *High Performance Computing 2000*, Apr. 2000, pp. 248–253.

Refereed Journal Papers

J1 Kurt B. Ferreira, Rolf Riesen, Patrick Bridges, **Dorian Arnold** and Ron Brightwell, "Accelerating Incremental Checkpointing for Extreme-Scale Computing", in *Future Generation of Computing Systems: Special Issue ESPAS*, 2013. (Accepted for publication.)

J2 **Joshua Goehner**, **Dorian Arnold**, Dong Ahn, Gregory Lee, Bronis de Supinski, Matthew Legendre, Martin Schulz, Barton Miller, "LIBI: A Framework for Bootstrapping Extreme Scale Software Systems", in *International Journal of Parallel Computing*, October 2012.

J3 Patrick Bridges, **Dorian Arnold**, Kevin Pedretti, Madhav Suresh, Feng Lu, Peter Dinda, Russel Joseph and Jack Lange, "VM-based Emulation of Future Generation High-performance Computing Systems", in *International Journal of High Performance Computing Applications*, Volume 26, Number 2, pages 125 – 135, May, 2012.

J4 Roy Keyes, Christian Romano, **Dorian Arnold**, and Shuang Luan, "Medical physics calculation in the cloud, a new paradigm for clinical computing" in *Medical Physics*, Volume 37, Issue 6, 2010. (Also in 52nd Annual Meeting of American Association of Physicists in Medicine (AAPM), 2010.)

J5 Manish Parashar, Rajeev Muralidhar, Wonsuck Lee, **Dorian Arnold**, Jack Dongarra, and Mary Wheeler, "Enabling Interactive and Collaborative Oil Reservoir Simulations on the Grid," in *Concurrency - Practice and Experience*, 17(11):1387–1414, 2005.

J6 **Dorian Arnold**, Henri Casanova, and Jack Dongarra, "Innovations of the NetSolve Grid Computing System," in *Grid Computing Environments. Special Issue of Concurrency and Computation: Practice and Experience*, 14(13–15):1457–1479, 2002.

J7 Micah Beck, **Dorian Arnold**, Alessandro Bassi, Francine Berman, Henri Casanova, Jack Dongarra, Terry Moore, Graziano Obertelli, James Plank, D. Martin Swany, Sathish Vadhiyar, and Richard Wolski, "Middleware for the Use of Storage in Communication," in *Parallel Computing*, 28(12):1773–1787, Dec. 2002.

J8 **Dorian Arnold**, Sathish Vadhiyar, and Jack Dongarra, "On the Convergence of Computational and Data Grids," in *Parallel Processing Letters*, 11(2,3):187–202, 2001.

Refereed Workshop Papers

W1 **Philip Soltero**, Patrick Bridges, **Dorian Arnold** and Michael Lang, "A Gossip-based Approach to Exascale System Services" in *International Workshop on Runtime and Operating Systems for Supercomputers (ROSS 2013)*, Eugene, Oregon, USA, June 10, 2013.

W2 Kurt B. Ferreira, Rolf Riesen, **Dorian Arnold**, **Dewan Ibtesham** and Ron Brightwell, "The Viability of Using Compression to Decrease Message Log Sizes" in *5th Workshop on Resiliency in High Performance Computing (Resilience) in Clusters, Clouds, and Grids (Resilience 2012)*, Rodos, Greece, August 2012.

W3 Jon Stearley, Kurt Ferreira, David Robinson, **Dorian Arnold**, Patrick Bridges, Jim Laros, Kevin Pedretti and Rolf Riesen, "Does Partial Replication Pay Off?" in *2nd Workshop on Fault-Tolerance for HPC at Extreme Scale (FTXS 2012)*, Boston, Massachusetts, June, 2012.

W4 **Dewan Ibtesham**, **Dorian Arnold**, Kurt Ferreira and Patrick Bridges, "On the Viability of Checkpoint Compression for Extreme Scale Systems" in *4th Workshop on Resiliency in High Performance Computing (Resilience) in Clusters, Clouds, and Grids (Resilience 2011)*, Bordeaux, France, August 2011.

W5 **Joshua Goehner**, **Dorian Arnold**, Dong Ahn, Gregory Lee, Bronis d Supinski, Matthew Legendre, Martin Schulz, Barton Miller, "A Framework for Bootstrapping Extreme Scale Software Systems", in *First International Workshop on High-performance Infrastructure for Scalable Tools (WHIST 2011))* , Tucson, AZ, June 2011.

W6 Patrick Bridges, **Dorian Arnold** and Kevin Pedretti, "VM-based Slack Simulation of Large-scale Systems", in *International Workshop on Runtime and Operating Systems for Supercomputers (ROSS 2011)*, Tucson, AZ, May 2011

W7 Aroon Nataraj, Allen Malony, Alan Morris, **Dorian Arnold** and Barton Miller, "A Framework for Scalable, Parallel Performance Monitoring using TAU and MRNet", in *International Workshop on Scalable Tools for High-End Computing (STHEC 2008)*, Island of Kos, Greece, June 2008.

W8 Gregory Lee, Dong Ahn, **Dorian Arnold**, Bronis de Supinski, Barton Miller, and Martin Schulz, "Benchmarking the Stack Trace Analysis Tool for BlueGene/L," in *International Conference on Parallel Computing (Mini-symposium)*, Jülich, Germany, Sep. 2007.

W9 **Dorian Arnold**, Gary Pack, and Barton Miller, "Tree-based Overlay Networks for Scalable Applications," in *11th International Workshop on High-Level Parallel Programming Models and Supportive Environments*, Rodos, Greece, Apr. 2006.

W10 Philip Roth, **Dorian Arnold**, and Barton Miller, "Benchmarking the MRNet Distributed Tool Infrastructure: Lessons Learned," in *High-Performance Grid Computing Workshop*, Santa Fe, NM, Apr. 2004.

W11 Micah Beck, **Dorian Arnold**, Alessandro Bassi, Jack Dongarra, Terry Moore, James Plank, D. Martin Swany, Sathish Vadhiyar, Richard Wolski, Francine Berman, Henri Casanova, and Graziano Obertelli, "Logistical Computing and Internetworking: Middleware for the Use of Storage in Communication," in *3rd Annual International Workshop on Active Middleware Services (AMS 2001)* , San Francisco, CA, Aug. 2001.

W12 **Dorian Arnold** and Jack Dongarra, "The NetSolve Environment: Progressing Towards the Seamless Grid", in *ICPP Workshop on Metacomputing Systems and Applications*, Toronto, Canada, Aug. 2000.

Book Chapters

B1 Elias Houstis, Ann Catlin, Nitesh Dhanjani, John Rice, Jack Dongarra, Henri Casanova, **Dorian Arnold**, and Geoffrey Fox, "Problem-solving Environments," in *The Sourcebook of Parallel Computing*, Chapter 14: pp. 409–442. Morgan Kaufmann, 2002.

B2 Mary Wheeler, Wonsuck Lee, Clint Dawson, **Dorian Arnold**, and Manish Parashar, "Parallel Computing in Environment and Energy," in *The Sourcebook of Parallel Computing*, Chapter 6: pp. l45–166. Morgan Kaufmann, 2002.

Recent Technical Reports and Papers Under Submission

T1 Ke Wang, Abhishek Kulkarni, Michael Lang, **Dorian Arnold** and Ioan Raicu, "Using Simulation to Design a Distributed Key-Value Store for Exascale System Services" (Under conference submission.)

T2 **Dewan Ibtesham**, **Dorian Arnold** and Kurt Ferreira, "Checkpoint Compression: Its Limits and a Comparison with other Optimizations". (Under conference submission.)

T3 **Taylor Groves** and **Dorian Arnold**, "Tree Aggregation Networks: Modeling and Topology Generation". (Under conference submission.)

T4 **Dorian Arnold**, Kurt Ferreira, Scott Levy, Ronald Brightwell and Patrick Bridges, "A Holistic Approach to Modeling and Simulation for Resilience and Power Configuration". (Under workshop submission.)

T5 Michael Lang, Ioan Raicu, **Dorian Arnold** and Ke Wang, "Design by Simulation: System Services for Exascale Systems". (Under workshop submission.)

T6 Patrick Widener, Kurt Ferreira, Scott Levy, Patrick Bridges, **Dorian Arnold** and Ron Brightwell, "Asking the right questions: benchmarking fault-tolerant extreme-scale systems". (Under workshop submission.)

T7 George Bezerra, Stephanie Forrest, **Dorian Arnold** and Payman Zarkesh-Ha, "Data Placement Optimization for Communication Energy Reduction in Chip Multi-Processors".

Other Technical Reports

T8 Sudesh Agrawal, **Dorian Arnold**, Susan Blackford, Jack Dongarra, Michelle Miller, Kiran Sagi, Zhao Shi, Keith Seymour, and Sathish Vahdiyar, "Users' Guide to NetSolve v1.4.1," ICL-UT-02-05, Computer Science, University of Tennessee, Jun. 2002.

T9 David Cronk, Graham Fagg, Brett Ellis, and **Dorian Arnold**, "Meta-Computing: An Evaluation of Emerging Systems," Engineer Research and Development Center Major Shared Resource Center, Apr. 2000.

Students

Current Graduate Research Assistants

Ph.D.   Zhenjie Chen, 3rd year.

Ph.D.   Taylor Groves, 5th year.

Ph.D.   Samuel Gutierrez, 4th year.

Ph.D.   Dewan Ibtesham, 5th year.

M.S.   Bryan Topp, 1st year.

Ph.D.   Shuang Yang, 3rd year. (co-advised with Patrick Bridges)

Other Graduate Research Advisees

Ph.D.   David Debonis.

M.S.   Lucille Frey.

Ph.D   Alireza Goudarzi. (Summer '13 project, co-advised with Professor Darko Stefanovic.)

Ph.D   Whit Schonbein. (Summer '13) project.

Former Research Advisees

M.S. '11   Joshua Goehner, Rogue Wave Software, Inc. (Graduated with distinction)

M.S. '09   Samuel Gutierrez, Los Alamos National Laboratory

B.S. '10   Christian Romano, co-advised undergraduate research w/ Prof. Shuang Luan.

'11   Nelson Burgos, Summer DREU Program

'11   Jonathan Stoppani, Summer visit to UNM to execute his B.S. project, co-advised w/ Prof. Patrick Bridges

Teaching

CS 481: Operating System Principles, Spring '13.

CS 591: Autonomic Computing, Fall '12. (Summary Evaluation: 3.8/5.0)

CS 341: Intro. to Computer Organization, Spring '12. (Summary Evaluation: 3.6/5.0)

CS 587: Advanced Operating Systems, Fall '11. (Summary Evaluation: 3.8/5.0)

CS 481: Operating System Principles, Spring '11. (Summary Evaluation: 4.0/5.0)
CS 587: Advanced Operating Systems, Fall '10. (Summary Evaluation: 3.8/5.0)
CS 591: Extreme Scale Computing, Spring '10. (Summary Evaluation: 4.5/5.0)
CS 587: Advanced Operating Systems, Fall '09. (Summary Evaluation: 4.2/5.0)
CS 481: Operating System Principles, Spring '09. (Summary Evaluation: 3.8/5.0)

▬▬▬ Professional Service and Activities

2013 Program Committees: SC, ISPA, HIPS

National Science Foundation (OCI and CRI) Proposal Review Panel

Committee Member, UNM CARC HPC Systems Engineer 3 Search

Chair, UNM Computer Science Colloquium Series

2012 Program Committees: SC, PACT, ICPP, HPCC, HiPC, ICA3PP, WHIST, ESPAS

National Science Foundation (CSR and SHF) Proposal Review Panels

Chair, UNM Computer Science Colloquium Series

Co-organizer, UNM Computer Science Graduate Student Visit Day

Committee Member, UNM CS Lecturer II Search

2011 Program Committees: SC, ICS, HiPC, HPCC, SBAC-PAD, WHIST

Co-chair, UNM Computer Science Colloquium Series

Co-organizer, UNM Computer Science Graduate Student Visit Day

New Mexico Supercomputing Challenge Judge

2010 Program Committees: SC

National Science Foundation (CCF, STCI, CRI) Proposal Review Panels

New Mexico Supercomputing Challenge Project Evaluator

2009 Finance Chair, PACT

Program Committees: HPCC, SBAC-PAD, iWAPT

Co-organizer, UNM Computer Science Graduate Student Visit Day

New Mexico Supercomputing Challenge Judge

Pre '09 Paper Reviewer: IEEE TNSM Journal, PACT 2009, SC 2007, DSN 2006, EuroPVM/MPI 2005, DSN 2004, PDP 2003, EuroPVM/MPI 2002, Euro-Par 2002.

▬▬▬ Awards and Honors

2011 R&D 100 Award for Development of Stack Trace Analysis Tool.

'06–'08 Intel Ph.D. Fellow, 1 of 41 nationally.

2003 Best Student Paper finalist, SC.

1999 R&D 100 Award for Development of NetSolve Project.

1997 Computer Science Graduate Teaching Assistant of the Year.

1996 Alan M. Turing Award for Excellence in Computer Science, Regis University.

1995 Invited to Regis Chapter of Alpha Sigma Nu, academic honors society.

1994 Regis University Natural Science Scholarship, 1 of 2 based on open examination.

1992 Government of Belize Junior College Scholarship, based on national examination.