

Curriculum Vitae

Ethan L. Miller

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EMPLOYMENT HISTORY

2017–present Professor, Computer Engineering Department, University of California, Santa Cruz
2014–present Veritas Presidential Chair in Storage [formerly Symantec Presidential Chair in Storage & Security], Jack Baskin School of Engineering, University of California, Santa Cruz
2013–present Director, NSF I/UCRC Center for Research in Storage Systems, University of California, Santa Cruz
2012–2013 Pure Storage (on 80% leave from the University of California, Santa Cruz)
2009–2013 Site Director, NSF I/UCRC Center for Research in Intelligent Storage, University of California, Santa Cruz
2008–2017 Professor, Computer Science Department, University of California, Santa Cruz
2007–present Associate Director, Storage Systems Research Center, University of California, Santa Cruz
2002–2008 Associate Professor, Computer Science Department, University of California, Santa Cruz
2000–2002 Assistant Professor, Computer Science Department, University of California, Santa Cruz
1999 System Architect, Endeca, Cambridge, MA
1994–2000 Assistant Professor, Computer Science and Electrical Engineering Department, University of Maryland Baltimore County
1988–1994 Research Assistant, Computer Science Division, University of California at Berkeley
1988–1990 Teaching Associate, Computer Science Division, University of California at Berkeley
1987–1988 Software Engineer, BBN Laboratories, Cambridge, MA
1986 Summer intern, GTE Government Systems, Rockville, MD

EDUCATION

1995 Ph. D., University of California at Berkeley, Computer Science (advisor: Randy Katz)
Thesis: *Storage Hierarchy Management for Scientific Computing*
1990 M. S., University of California at Berkeley, Computer Science
1987 Sc. B., Brown University, Computer Science, *magna cum laude*

HONORS & AWARDS

2016 Best Paper award, MASCOTS 2016.
2015 Best Paper award, MSST 2015.
2015 Best Paper award, SYSTOR 2015.
2015 Named IEEE Fellow.
2013 Named ACM Distinguished Scientist.
2005 Best Long Paper award, StorageSS, 2005.
2004 Best Paper award, MASCOTS 2004.
2001 Elevated to Senior Member, IEEE.
1987 William Gaston Prize for Academic Excellence (award made to top graduating students at Brown University).
1987 Elected to Sigma Xi, Brown University.

GRANTS

In addition to the grants listed below, I have helped bring in industrial funding for the Storage Systems Research Center, which was funded at \$100,000–\$250,000 per year from 2002–2008. From 2009 onward, industry funding was primarily in the form of membership fees to an NSF Industry/University Cooperative Research Center. The UC Santa Cruz site of this Center has received \$2.88 million in membership fees from 2009 through May 2017. Funding companies have included EMC, Exablox, Hewlett Packard, Hitachi, Honeycomb Data, Huawei, IBM, Intel, Avago / LSI, NetApp, Northrop Grumman, Permabit, Pure Storage, Samsung, Sandisk, Scality, Seagate, SK Hynix, Symantec / Veritas, Toshiba, and Western Digital.

- 2018–2022 PI, *Phase II IUCRC CRSS: Center for Research in Storage Systems*, \$500,000 (co-PI: Darrell Long, UC Santa Cruz; co-PI, Heiner Litz, UC Santa Cruz) **[pending]**
- 2018–2020 co-PI, *CSR: Small: A Multi-Layered Deniable Steganographic File System*, \$496,897 (PI: Darrell Long, UC Santa Cruz)
- 2016–2019 co-PI, *PFI:BIC:RouteMe2: A Cloud-Integrated Sensor Testbed for Assisted Public Transportation*, \$999,846 (PI: Roberto Manduchi, UC Santa Cruz; co-PI: Sri Kurniawan, UC Santa Cruz; co-PI: Adam Millard-Ball, UC Santa Cruz)
- 2013–2018 PI, *IUCRC: A Single-Site IUCRC Center for Research in Storage Systems (CRSS)* National Science Foundation, \$468,850 (co-PI: Darrell Long, UC Santa Cruz). Industrial membership fees for this center have totaled \$1.86 million, as of May 2017.
- 2010–2013 co-PI, *Dynamic Non-Hierarchical File Systems for Exascale Storage*, Department of Energy (PI: Darrell Long), \$1,462,000.
- 2010–2014 co-PI, *LockBox: Enabling Users to Keep Data Safe*, National Science Foundation, \$496,000. (PI: Darrell Long).
- 2010 Gift from the Academy of Motion Picture Arts and Sciences in support of research on long-term archival storage, \$33,000.
- 2009–2013 PI, *Collaborative Research: A Multi-University IUCRC Center on Intelligent Storage*, National Science Foundation, \$275,000 [UC Santa Cruz portion] (PI: David Du, University of Minnesota; co-PI: Darrell Long, UC Santa Cruz). Industrial membership fees for the UC Santa Cruz site of this center totaled \$1.02 million.
- 2009–2013 PI, *Scalable Data Management Using Metadata and Provenance*, National Science Foundation, \$553,000 (co-PI: Darrell Long; PI Margo Seltzer [Harvard] received an additional \$350,000 for a collaborative grant on this project).
- 2009–2013 PI, *Managing and Indexing Exascale Archival Storage Systems*, National Science Foundation, \$489,000.
- 2009–2010 Co-PI, *Trading Storage for Computation*, NASA Ames University-Affiliated Research Center (PI: Darrell Long), \$61,000.
- 2009–2010 Co-PI, *Development of a Collaborative Project for Remotely Sensed Science and Technology*, NASA Ames University-Affiliated Research Center (PI: Raphe Kudela, co-PIs: Darrell Long, Donald Potts, Eli Silver, Michael Loik, Chris Wilmers, Jeff Myers, Liane Guild, Francis Enomoto), \$100,000.
- 2007 co-PI, *ViewFS: Dynamic Name-Spaces for Metadata-Rich File Systems*, Lawrence Livermore National Laboratory, \$74,994 (PI: Darrell Long).
- 2006–2010 Co-PI, *Petascale Data Storage Institute*, \$9,000,000, Department of Energy (lead PI: Garth Gibson; UCSC PI: Darrell Long; other UC Santa Cruz co-PI is Scott Brandt). The Institute funds research at three universities and five national laboratories, with \$1,200,000 going to UC Santa Cruz.
- 2006–2009 Co-PI, *File System Tracing, Replaying, Profiling, and Analysis on HEC Systems*, National Science Foundation, \$760,252 (PI: Erez Zadok, Stony Brook University; co-PI: Klaus Mueller, Stony Brook University).
- 2006–2007 Co-PI, *Institute for Scalable Scientific Data Management*, Los Alamos National Laboratory, \$750,000 (PI: Darrell Long; co-PI: Scott Brandt; co-PI: Carlos Maltzahn).
- 2005–2006 PI, *Adaptive Workload-Aware Algorithms for Heterogeneous Storage Systems*, UC MICRO, \$80,269 (includes \$45,000 gift from Veritas).
- 2005–2006 Co-PI, *Scalable File Systems For High Performance Computing*, Lawrence Livermore National Laboratory, Los Alamos National Laboratory, and Sandia National Laboratory, \$250,000 (PI: Scott Brandt; co-PI: Darrell Long; co-PI: Martín Abadi; co-PI: Carlos Maltzahn).

- 2005–2006 Co-PI, *Institute for Scalable Scientific Data Management*, Los Alamos National Laboratory, \$750,000 (PI: Darrell Long; co-PI: Scott Brandt).
- 2005 Co-PI, *Trustworthy Computing Curriculum Development*, Microsoft, \$50,000 (PI: Ira Pohl; co-PI: Martín Abadi; co-PI: Jim Whitehead).
- 2004 PI, *Research in Storage and Networks*, Hewlett-Packard Laboratories, \$25,000.
- 2003 PI, *Research in Storage and Networks*, Hewlett-Packard Laboratories, \$35,000.
- 2003–2006 PI, *Building High-performance, Reliable Storage Systems Using Magnetic RAM*, National Science Foundation, \$414,000 (co-PI: Scott Brandt).
- 2002–2005 Co-PI, *Scalable File Systems for High Performance Computing*, Department of Energy, \$900,000 (PI: Darrell Long; co-PI: Scott Brandt; co-PI: Katia Obraczka).
- 2002 PI, *Research in Storage and Networks*, Hewlett-Packard Laboratories, \$42,000.
- 2001–2002 Co-PI, *Building a High-Performance Storage System from Commodity Components*, Lawrence Livermore National Laboratory, \$65,000 (PI: Darrell Long; co-PI: Scott Brandt).
- 2001 PI, *Research in Storage and Networks*, Hewlett-Packard Laboratories, \$38,000.
- 1998–2001 Faculty Fellowship, University of Maryland Institute for Advanced Computer Studies, \$30,000.
- 1997–2001 Co-PI, *Center for Architectures for Data-Driven Information Processing*, Department of Defense, \$3,000,000 (PI: Charles Nicholas; co-PI: David Ebert).
- 1997–1998 PI, *Scalable Benchmarks for Mass Storage Systems*, NASA Ames Research Center, \$200,000.
- 1995–1997 Co-PI, *Scalability of the TELLTALE Dynamic Hypertext Environment*, Department of Defense, \$100,000 (PI: Charles Nicholas).
- 1995–1998 Faculty Fellowship, University of Maryland Institute for Advanced Computer Studies, \$30,000.
- 1989–1993 Graduate Fellowship, National Science Foundation.
- 1988–1989 Cal MICRO Fellowship, University of California at Berkeley.

SCHOLARLY AND CREATIVE WORK

NOTE: (*) denotes a student co-author, and (‡) denotes a student co-author who was one of my advisees at the time the paper was written.

Edited Books

- EB1. Erik Elmroth, Michael Factor, **Ethan L. Miller**, Margo Seltzer (eds.), “Is the Future of Preservation Cloudy? (Dagstuhl Seminar 12472)”, *Dagstuhl Reports* **2**(11), November 2012, pages 102–134.

Chapters in Books

- CH1. Claudia Pearce and **Ethan Miller**, “The TELLTALE Dynamic Hypertext Environment: Approaches to Scalability”, in *Advances in Intelligent Hypertext*, J. Mayfield and C. Nicholas, eds. *Lecture Notes in Computer Science*, Springer-Verlag, October 1997, pages 109–130.

Journal Papers

- J17. Avani Wildani, **Ethan L. Miller**, “Can We Group Storage? Statistical Techniques to Identify Predictive Groupings in Storage System Accesses”, *ACM Transactions on Storage*, **12**(2), February 2016.
- J16. Stephanie Jones*, Ahmed Amer, **Ethan L. Miller**, Darrell D. E. Long, Rekha Pitchumani, Christina Strong*, “Classifying Data to Reduce Long-Term Data Movement in Shingled Write Disks”, *ACM Transactions on Storage* **12**(1), February 2016.
- J15. Alberto Miranda*, Sascha Effert*, Yangwook Kang‡, **Ethan L. Miller**, Ivan Popov*, André Brinkmann, Tom Friedetzky, Toni Cortes, “Random Slicing: Efficient and Scalable Data Placement for Large-scale Storage Systems”, *ACM Transactions on Storage* **10**(3), July 2014.
- J14. Ian F. Adams‡, Mark W. Storer, and **Ethan L. Miller**, “Analysis of Workload Behavior in Scientific and Historical Long-Term Data Repositories”, *ACM Transactions on Storage* **8**(2), May 2012. Preliminary version available as Technical Report UCSC-SSRC-11-01.

- J13. Ahmed Amer, JoAnne Holliday, Darrell D. E. Long, **Ethan L. Miller**, Jehan-François Pâris, and Thomas Schwarz, S. J., “Data Management and Layout for Shingled Magnetic Recording”, *IEEE Transactions on Magnetics* **47**(10), October 2011, pages 3691–3697.
- J12. Mark W. Storer[‡], Kevin M. Greenan[‡], **Ethan L. Miller**, and Kaladhar Voruganti, “POTSHARDS—A Secure, Recoverable, Long-Term Archival Storage System”, *ACM Transactions on Storage* **5**(2), June 2009, pages 5:1–5:35.
- J11. Andrew W. Leung[‡], Minglong Shao, Tim Bisson, Shankar Pasupathy, and **Ethan L. Miller**, “High-Performance Metadata Indexing and Search in Petascale Data Storage Systems”, *Journal of Physics: Conference Series* **125** (2008) 012069, July 2008.
- J10. Carlos Maltzahn, Nikhil Bobb*, Mark W. Storer[‡], Damian Eads[‡], Scott A. Brandt, and **Ethan L. Miller**, “Graffiti: A Framework for Testing Collaborative Distributed Metadata”, *Distributed Data & Structures 7, Proceedings in Informatics* **21**, Carleton Scientific, 2007, pages 97–111. Extended version of the WDAS 2006 workshop paper.
- J9. Bo Hong*, Scott A. Brandt, Darrell D. E. Long, **Ethan L. Miller**, and Ying Lin*, “Using MEMS-Based Storage in Computer Systems—MEMS Storage Device Modeling and Management”, *ACM Transactions on Storage* **2**(2), May 2006, pages 139–160.
- J8. Qin Xin[‡], Thomas J. E. Schwarz, and **Ethan L. Miller**, “Availability in Global Peer-To-Peer Storage Systems”, *Distributed Data & Structures 6, Proceedings in Informatics* **20**, Carleton Scientific, 2005, pages 63–77. Extended version of the WDAS 2004 workshop paper.
- J7. Ismail Ari[‡], Ahmed Amer*, Robert Gramacy*, **Ethan L. Miller**, Scott A. Brandt, Darrell D. E. Long, “ACME: Adaptive Caching Using Multiple Experts”, *Distributed Data & Structures 5, Proceedings in Informatics* **14**, Carleton Scientific, 2002, pages 143–158. Extended version of the WDAS 2002 workshop paper.
- J6. **Ethan Miller**, Dan Shen[‡], Junli Liu[‡], and Charles Nicholas, “Performance and Scalability of a Large-Scale N-gram Based Information Retrieval System”, *Journal of Digital Information* **1**(5), January 2000, 25 pages (online refereed journal).
- J5. Christopher Shaw, James Kukla*, Ian Soboroff*, David Ebert, Charles Nicholas, Amen Zwa*, **Ethan Miller**, and D. Aaron Roberts, “Interactive Volumetric Information Visualization for Document Corpus Management”, *International Journal on Digital Libraries* **2**(2–3), 1999, pages 144–156.
- J4. Jeffrey Hollingsworth, **Ethan Miller**, and Kennedy Akala[‡], “Binary Version Management for Computational Grids”, *Parallel Processing Letters* **9**(2), June 1999, pages 215–225.
- J3. **Ethan Miller** and Randy Katz, “RAMA: An Easy-To-Use, High-Performance Parallel File System”, *Parallel Computing* **23**(4), July 1997, pages 419–446.
- J2. David Ebert, Amen Zwa*, **Ethan Miller**, Chris D. Shaw, and D. Aaron Roberts, “Two-handed Volumetric Document Corpus Management”, *IEEE Computer Graphics and Applications* **17**(4), July 1997, pages 60–62.
- J1. Peter Chen, Edward Lee, Ann Drapeau, Ken Lutz, **Ethan Miller**, Srinu Seshan, Ken Shirriff, David Patterson, and Randy Katz, “Performance and Design Evaluation of the RAID-II Storage Server”, *Journal of Distributed and Parallel Databases* **2**(3), July 1994, pages 243–260.

Invited Journal Papers

- IJ4. Andrew W. Leung[‡], Minglong Shao, Tim Bisson, Shankar Pasupathy, and **Ethan L. Miller**, “Spyglass: Fast, Scalable Metadata Search for Large-Scale Storage Systems”, *login*: **34**(3), USENIX Association, June 2009.
- IJ3. Avishay Traeger, Erez Zadok, **Ethan L. Miller**, and Darrell D. E. Long, “Findings from the First Annual Storage and File Systems Benchmarking Workshop”, *login*: **33**(5), USENIX Association, October 2008, pages 113–117.
- IJ2. Mark W. Storer[‡], Kevin M. Greenan[‡], **Ethan L. Miller**, and Kaladhar Voruganti, “Pergamum: energy-efficient archival storage with disk instead of tape”, *login*: **33**(3), USENIX Association, June 2008, pages 15–21.
- IJ1. Randy Katz, John Ousterhout, David Patterson, Peter Chen, Ann Chervenak, Rich Drewes, Garth Gibson, Edward Lee, Ken Lutz, Ethan Miller, and Mendel Rosenblum, “A Project on High-Performance I/O Subsystems”, *Computer Architecture News* **17**(5):24–31, September 1989.

Refereed Conference & Workshop Papers

- C132. James Byron[‡], **Ethan L. Miller**, Darrell D. E. Long, “Using Simulation to Design Scalable and Cost-Efficient Archival Storage Systems”, *Proceedings of the 26th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2018)*, Milwaukee, WI, September 2018.
- C131. Sinjoni Mukhopadhyay*, Joel Frank*, Daniel Bittman[‡], Darrell D. E. Long, **Ethan L. Miller**, “Efficient Reconstruction Techniques for Disaster Recovery in Secret-Split Datastores”, *Proceedings of the 26th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2018)*, Milwaukee, WI, September 2018.
- C130. Daniel Bittman[‡], Matthew Gray*, Justin Raizes*, Sinjoni Mukhopadhyay*, Matt Bryson[‡], Peter Alvaro, Darrell D. E. Long, **Ethan L. Miller**, “Designing Data Structures to Minimize Bit Flips on NVM”, *Proceedings of the 7th IEEE Non-Volatile Memory Systems and Applications Symposium (NVMSA 2018)*, Hakodate, Japan, August 2018.
- C129. Yuanjiang Ni[‡], Jishen Zhao, Daniel Bittman[‡], **Ethan Miller**, “Reducing NVM Writes with Optimized Shadow Paging”, *Proceedings of HotStorage 2018*, Boston, MA: USENIX, July 2018.
- C128. Veronica Estrada-Galinañes, **Ethan L. Miller**, Pascal Felber, Jehan-François Pâris, “Alpha Entanglement Codes: Practical Erasure Codes to Archive Big Data in Unreliable Environments”, *Proceedings of the 48th IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2018)*, Luxembourg City, Luxembourg, June 2018.
- C127. Oceane Bel*, Kenneth Chang[‡], Daniel Bittman[‡], **Ethan L. Miller**, Darrell D. E. Long, Hiroshi Isozaki, “Inkpack: A Secure, Data-Exposure Resistant Storage System” *Proceedings of SYSTOR 2018: The 11th Annual International Systems and Storage Conference*, Haifa, Israel: ACM, June 2018.
- C126. Matheus Ogleari*, **Ethan L. Miller**, Jishen Zhao, “Steal but no force: Efficient Hardware-driven Undo+Redo Logging for Persistent Memory Systems”, *Proceedings of the 24th IEEE International Symposium on High-Performance Computer Architecture (HPCA 2018)*, Vienna, Austria, February 2018.
- C125. Yan Li*, Kenneth Chang[‡], Oceane Bel*, **Ethan L. Miller**, Darrell D. E. Long, “CAPES: Unsupervised Storage Performance Tuning Using Neural Network-Based Deep Reinforcement Learning”, *Proceedings of SC2017*, Denver, CO: ACM & IEEE, November 2017. Nominated for Best Student Paper.
- C124. Thomas Schwarz, Ahmed Amer, Thomas Kroeger, **Ethan L. Miller**, Darrell D. E. Long, Jehan-François Pâris, “RESAR: Reliable Storage at Exabyte Scale”, *Proceedings of the 24th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2016)*, London, UK: IEEE, September 2016. Won Best Paper Award.
- C123. Yan Li*, **Ethan L. Miller**, Darrell D. E. Long, Yash Gupta*, “Pilot: A Framework that Understands How to Do Performance Benchmarks The Right Way”, *Proceedings of the 24th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2016)*, London, UK: IEEE, September 2016.
- C122. Preeti Gupta[‡], Avani Wildani, Darrell D. E. Long, **Ethan L. Miller**, David S. H. Rosenthal, “Effects of Prolonged Media Usage and Long-term Planning on Archival Systems”, *Proceedings of the 32nd International Conference on Mass Storage Systems and Technologies (MSST 2016)*, Santa Clara, CA, May 2016.
- C121. Yan Li*, Xioayuan Lu[‡], **Ethan L. Miller**, Darrell D. E. Long, “ASCAR: Automating Contention Management for High-Performance Storage Systems”, *Proceedings of the 31st International Conference on Mass Storage Systems and Technologies (MSST 2015)*, Santa Clara, CA, June 2015.
- C120. Joel C. Frank*, Shayna M. Frank[‡], Lincoln A. Thurlow[‡], Thomas M. Kroeger, **Ethan L. Miller**, Darrell D. E. Long, “Percival: A Searchable Secret Split Datastore”, *Proceedings of the 31st International Conference on Mass Storage Systems and Technologies (MSST 2015)*, Santa Clara, CA, June 2015.
- C119. Stephanie Jones*, Ahmed Amer, **Ethan L. Miller**, Darrell D. E. Long, Rekha Pitchumani[‡], Christina Strong*, “Classifying Data to Reduce Long Term Data Movement in Shingled Write Disks”, *Proceedings of the 31st International Conference on Mass Storage Systems and Technologies (MSST 2015)*, Santa Clara, CA, June 2015. Won Best Paper Award.
- C118. Rekha Pitchumani[‡], Shayna Frank[‡], **Ethan L. Miller**, “Realistic Request Arrival Generation In Storage Benchmarks”, *Proceedings of the 31st International Conference on Mass Storage Systems and Technologies (MSST 2015)*, Santa Clara, CA, June 2015.

- C117. John Colgrove, John D. Davis, John Hayes, **Ethan L. Miller**, Cary Sandvig, Russell Sears, Ari Tamches, Neil Vachharajani, Feng Wang, “Purity: Building Fast, Highly-Available Enterprise Flash Storage from Commodity Components”, *Proceedings of SIGMOD 2015: Industrial Track*, Melbourne, Australia, June 2015.
- C116. Rekha Pitchumani[‡], James Hughes, **Ethan L. Miller**, “SMRDB: Key-Value Data Store for Shingled Magnetic Recording Disks”, *Proceedings of SYSTOR 2015: The 8th Annual International Systems and Storage Conference*, Haifa, Israel: ACM, May 2015. Won Best Paper Award.
- C115. Preeti Gupta[‡], Avani Wildani, Ian F. Adams, Christina Strong*, Daniel Rosenthal[‡], **Ethan L. Miller**, Andy Hospodor, “An Economic Perspective of Disk vs. Flash Media in Archival Storage”, *Proceedings of the 22nd IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2014)*, Paris, France: IEEE, September 2014.
- C114. Avani Wildani, **Ethan L. Miller**, Ian F. Adams, Darrell D. E. Long, “PERSES: Data Layout for Low Impact Failures”, *Proceedings of the 22nd IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2014)*, Paris, France: IEEE, September 2014. Preliminary version available as Technical Report UCSC-SSRC-12-06.
- C113. Yangwook Kang[‡], Thomas Marlette[‡], Rekha Pitchumani[‡], **Ethan L. Miller**, “Muninn: A Versioning Flash Key-Value Store Using an Object-based Storage Model”, *Proceedings of SYSTOR 2014: The 7th Annual International Systems and Storage Conference*, Haifa, Israel, June 2014.
- C112. Aleatha Parker-Wood*, Darrell D. E. Long, **Ethan L. Miller**, Philippe Rigaux, and Andy Isaacson, “A File By Any Other Name: Managing File Names with Metadata”, *Proceedings of SYSTOR 2014: The 7th Annual International Systems and Storage Conference*, Haifa, Israel, June 2014.
- C111. Avani Wildani[‡], Ian F. Adams[‡], **Ethan L. Miller**, “Single-Snapshot File System Analysis”, *Proceedings of the 21st IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2013)*, San Francisco, CA: IEEE, August 2013.
- C110. Ian F. Adams[‡], Mark W. Storer, Avani Wildani[‡], **Ethan L. Miller**, Brian A. Madden*, “Validating Storage System Instrumentation”, *Proceedings of the 21st IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2013)*, San Francisco, CA: IEEE, August 2013.
- C109. Yangwook Kang[‡], Yang-Suk Kee, **Ethan L. Miller**, Chanik Park, “Enabling Cost-effective Data Processing with Smart SSD”, *Proceedings of the 29th IEEE Symposium on Mass Storage Systems and Technologies (MSST 2013)*, Long Beach, CA: IEEE, May 2013.
- C108. Avani Wildani[‡], **Ethan L. Miller**, Ohad Rodeh, “HANDS: A Heuristically Arranged Non-Backup In-line Deduplication System”, *Proceedings of the 29th IEEE International Conference on Data Engineering (ICDE 2013)*, Brisbane, Australia: IEEE, April 2013. Preliminary version available as Technical Report UCSC-SSRC-12-03.
- C107. Yan Li*, Nakul Sanjay Dhotre*, Yasuhiro Ohara, Thomas M. Kroeger, Darrell D. E. Long, **Ethan L. Miller**, “Horus: Fine-Grained Encryption-Based Security for Large-Scale Storage”, *Proceedings of the 11th Conference on File and Storage Technologies (FAST ’13)*, San Jose, CA: USENIX, February 2013.
- C106. James S. Plank, Kevin M. Greenan, **Ethan L. Miller**, “Screaming Fast Galois Field Arithmetic Using Intel SIMD Extensions”, *Proceedings of the 11th Conference on File and Storage Technologies (FAST ’13)*, San Jose, CA: USENIX, February 2013.
- C105. Ian F. Adams[‡], Brian A. Madden*, Joel C. Frank[‡], Mark W. Storer, **Ethan L. Miller**, Gene Harano, “Usage Behavior of a Large-Scale Scientific Archive”, *Proceedings of SC2012*, Salt Lake City, UT: ACM, November 2012.
- C104. David S. H. Rosenthal, Daniel C. Rosenthal[‡], **Ethan L. Miller**, Ian F. Adams[‡], Mark W. Storer, Erez Zadok, “The Economics of Long-Term Digital Storage”, *The Memory of the World in the Digital Age: Digitization and Preservation*, Vancouver, BC, September 2012.
- C103. Joel C. Frank[‡], **Ethan L. Miller**, Ian F. Adams[‡], Daniel C. Rosenthal[‡], “Evolutionary Trends in a Supercomputing Tertiary Storage Environment”, *Proceedings of the 20th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2012)*, Washington, DC, August 2012.

- C102. Rekha Pitchumani[‡], Andy Hospodor, Ahmed Amer, Yangwook Kang[‡], **Ethan L. Miller**, and Darrell D. E. Long, “Emulating a Shingled Write Disk”, *Proceedings of the 20th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2012)*, Washington, DC, August 2012.
- C101. Yan Li*, **Ethan L. Miller**, and Darrell D. E. Long, “Understanding Data Survivability in Archival Storage Systems”, *Proceedings of SYSTOR 2012: The 5th Annual International Systems and Storage Conference*, Haifa, Israel, June 2012.
- C100. Alberto Miranda*, Sascha Effert*, Yangwook Kang[‡], **Ethan L. Miller**, André Brinkmann, and Toni Cortes, “Reliable and Randomized Data Distribution Strategies for Large Scale Storage Systems”, *Proceedings of the 2011 High Performance Computing Conference (HiPC 2011)*, Bengaluru, India, December 2011.
- C99. Ranjana Rajendran*, **Ethan L. Miller**, and Darrell D. E. Long, “Horus: Fine-Grained Encryption-Based Security for High Performance Petascale Storage”, *Proceedings of the 6th Parallel Data Storage Workshop (PDSW11)*, held in conjunction with *SC2011*, Seattle, WA, November 2011.
- C98. Stephanie N. Jones*, Christina R. Strong*, Darrell D. E. Long, and **Ethan L. Miller** “Tracking Emigrant File Data via Transient Provenance”, *Proceedings of the 2011 Workshop on the Theory and Practice of Provenance (TaPP '11)*, Heraklion, Crete, Greece, June 2011.
- C97. Avani Wildani[‡], **Ethan L. Miller**, and Lee Ward, “Efficiently Identifying Working Sets in Block I/O Streams”, *Proceedings of SYSTOR 2011: The 4th Annual International Systems and Storage Conference*, Haifa, Israel, May 2011.
- C96. Yangwook Kang[‡], Jingpei Yang[‡], **Ethan L. Miller**, “Object-based SCM: An Efficient Interface for Storage Class Memories”, *Proceedings of the 27th IEEE Symposium on Mass Storage Systems and Technologies (MSST 2011)*, Denver, CO: IEEE, May 2011.
- C95. Avani Wildani[‡], **Ethan L. Miller**, “Semantic Data Placement for Power Management in Archival Storage”, *Proceedings of the 5th International Workshop on Petascale Data Storage (PDSW10)*, held in conjunction with *SC2010*, New Orleans, LA, November 2010.
- C94. Ian Adams[‡], Mark W. Storer, and **Ethan L. Miller**, “Examining Energy Use in Heterogeneous Archival Storage Systems”, *Proceedings of the 18th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2010)*, Miami, FL: IEEE, September 2010, pages 297–306.
- C93. Yangwook Kang[‡], Jingpei Yang[‡], and **Ethan L. Miller**, “Efficient Storage Management for Object-based Flash Memory”, *Proceedings of the 18th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2010)*, Miami, FL: IEEE, September 2010, pages 407–409.
- C92. Aleatha Parker-Wood[‡], Christina Strong*, **Ethan L. Miller**, and Darrell D. E. Long, “Security Aware Partitioning for Efficient File System Search”, *Proceedings of the 26th IEEE Symposium on Mass Storage Systems and Technologies (MSST 2010)*, Incline Village, NV: IEEE, May 2010, 14 pages.
- C91. Ahmed Amer, Darrell D. E. Long, **Ethan L. Miller**, Jehan-François Pâris, and Thomas Schwarz, “Design Issues for a Shingled Write Disk System”, *Proceedings of the 26th IEEE Symposium on Mass Storage Systems and Technologies (MSST 2010)*, Incline Village, NV: IEEE, May 2010, 12 pages.
- C90. Yangwook Kang[‡] and **Ethan L. Miller**, “Adding Aggressive Error Correction to a High-Performance Flash File System”, *Proceedings of the 9th ACM & IEEE Conference on Embedded Software (EMSOFT '09)*, Grenoble, France : ACM / IEEE, October 2009, pages 305–314.
- C89. Avani Wildani[‡], Thomas J. E. Schwarz, **Ethan L. Miller**, and Darrell D. E. Long, “Protecting Against Rare Event Failures in Archival Systems”, *Proceedings of the 17th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS 2009)*, London, UK: IEEE, September 2009, 11 pages. Preliminary version available as Technical Report UCSC-SSRC-09-03.
- C88. Kevin Greenan[‡], Darrell D. E. Long, **Ethan L. Miller**, Thomas Schwarz, and Avani Wildani[‡], “Building Flexible, Fault-Tolerant Flash-based Storage Systems”, *Proceedings of the 5th Workshop on Hot Topics in System Dependability (HotDep 2009)*, Estoril, Portugal, June 2009.

- C87. Ian F. Adams[‡], Darrell D. E. Long, **Ethan L. Miller**, Shankar Pasupathy, and Mark W. Storer, “Maximizing Efficiency By Trading Storage for Computation”, *Proceedings of the Workshop on Hot Topics in Cloud Computing (HotCloud '09)*, San Diego, CA: USENIX, June 2009, 5 pages.
- C86. Keren Jin[‡] and **Ethan L. Miller**, “The Effectiveness of Deduplication on Virtual Machine Disk Images”, *Proceedings of SYSTOR 2009: The Israeli Experimental Systems Conference*, Haifa, Israel, May 2009, 12 pages.
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Invited Conference Papers

- IC3. **Ethan L. Miller** and Darrell D. E. Long, “Including Experimental Methods in Operating Systems Courses”, ACM Workshop on Experimental Computer Science (ExpCS 2007), San Diego, CA, June 2007.
- IC2. **Ethan L. Miller**, “Dealing with Long-Lived Data in High Performance Storage Systems”, *Storage on the Lunatic Fringe: Beyond Peta-Scale Storage Systems*, workshop at Supercomputing 2003, Phoenix, AZ, November 2003.
- IC1. **Ethan Miller**, Darrell Long, William Freeman[‡], and Benjamin Reed*, “Strong Security for Distributed File Systems”, *Proceedings of the 20th IEEE International Performance, Computing, and Communications Conference (IPCCC 2001)*, Phoenix, AZ: IEEE, April 2001, pages 34–40.

Patents

- PA72. John Colgrove, **Ethan Miller**, John Hayes, Cary Sandvig, Christopher Golden, Jianting Cao. Restoring a Volume in a Storage System. US Patent 10,013,317, issued July 3, 2018. Assignee: Pure Storage.
- PA71. Ronald Karr, **Ethan L. Miller**, Cary A. Sandvig, Feng Wang, Wei Zhang. Generating and Optimizing Summary Index Levels in a Deduplication Storage System. US Patent 9,983,822, issued May 29, 2018. Assignee: Pure Storage.

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- PA68. Benjamin P. Borowiec, Jimmy T. Hu, **Ethan L. Miller**, Terence W. Noonan, Constantine P. Sapuntzakis, Neil A. Vachharajani, Daquan Zuo. Delivering authorization and authentication for a user of a storage array from a cloud. US Patent 9,882,913, issued Jan. 30, 2018. Assignee: Pure Storage.
- PA67. John Colgrove, **Ethan Miller**, John Hayes, Cary Sandvig, Christopher Golden, Jianting Cao, Grigori Inozemtsev. "Processing copy offload requests in a storage system". US Patent 9,880,779, issued Jan. 30, 2018. Assignee: Pure Storage.
- PA66. John Colgrove, Lydia Do, **Ethan Miller**. Data migration in a storage array that includes a plurality of storage devices. US Patent 9,817,603, issued Nov. 14, 2017. Assignee: Pure Storage.
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- PA63. John Davis, **Ethan Miller**, Brian Gold, John Colgrove, Peter Vajgel, John Hayes, Alex Ho. Data placement based on data retention in a tiered storage device system. US Patent 9,811,457, issued Nov. 7, 2017. Assignee: Pure Storage.
- PA62. John Colgrove, Lydia Do, Ethan Miller, Terence Noonan. Deploying client-specific applications in a storage system utilizing redundant system resources. US Patent 9,811,264, issued Nov. 7, 2017. Assignee: Pure Storage.
- PA61. **Ethan Miller**, John Colgrove, John Hayes, Cary Sandvig. Distributing data blocks across a plurality of storage devices. US Patent 9,792,045, issued Oct 17, 2017. Assignee: Pure Storage.
- PA60. John Colgrove, Mark L. McAuliffe, **Ethan L. Miller**, Naveen Neelakantam, Marco Sanvido, Neil A. Vachharajani, Taher Vohra. Utilizing a non-repeating identifier to encrypt data. US Patent 9,779,268, issued Oct. 3, 2017. Assignee: Pure Storage.
- PA59. Andrew R. Bernat, **Ethan L. Miller**. Resharing of a split secret. US Patent 9,768,953, issued Sep. 19, 2017. Assignee: Pure Storage.
- PA58. John Colgrove, **Ethan Miller**, John Hayes, Cary Sandvig, Christopher Golden, Jianting Cao, Grigori Inozemtsev. Performing copies in a storage system. US Patent 9,760,313, issued Sep. 12, 2017. Assignee: Pure Storage.
- PA57. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Proactively correcting behavior that may affect I/O performance in a non-volatile semiconductor storage device. US Patent 9,684,460, issued June 20, 2017. Assignee: Pure Storage.
- PA56. John Colgrove, **Ethan Miller**, John Hayes, Cary Sandvig, Christopher Golden, Jianting Cao. Snapshots in a storage system. US Patent 9,646,039, issued May 9, 2017. Assignee: Pure Storage.
- PA55. John Davis, **Ethan Miller**, Brian Gold, John Colgrove, Peter Vajgel, John Hayes, Alex Ho. Data placement based on data properties in a tiered storage device system. US Patent 9,612,953, issued April 4, 2017. Assignee: Pure Storage.
- PA54. Ronald S. Karr, **Ethan L. Miller**. Preventing duplicate entries of identical data in a storage device. US Patent 9,594,678, issued March 14, 2017. Assignee: Pure Storage.
- PA53. John Colgrove, John Hayes, Bo Hong, **Ethan Miller**. Adaptive RAID for an SSD environment. US Patent 9,594,633, issued March 14, 2017. Assignee: Pure Storage.
- PA52. John Colgrove, **Ethan Miller**, John Hayes, Cary Sandvig, Christopher Golden, Jianting Cao, Deduplication of volume regions. US Patent 9,589,008, issued March 7, 2017. Assignee: Pure Storage.
- PA51. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of Reactive I/O in a storage environment. US Patent 9,588,699, issued March 7, 2017. Assignee: Pure Storage.

- PA50. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of I/O in an SSD environment. US Patent 9,569,116, issued Feb. 14, 2017. Assignee: Pure Storage.
- PA49. **Ethan Miller**, Benjamin Borowiec, Steve Hodgson. Cloud alert to replica. US Patent 9,552,248, issued Jan. 24, 2017. Assignee: Pure Storage.
- PA48. **Ethan Miller**, John Colgrove, John Hayes. Multi-drive cooperation to generate an encryption key, US Patent 9,548,972, issued Jan. 17, 2017. Assignee: Pure Storage.
- PA47. John Colgrove, **Ethan Miller**, John Hayes. Storage array password management. US Patent 9,516,016, issued Dec. 6, 2016. Assignee: Pure Storage.
- PA46. John Colgrove, Lydia Do, **Ethan Miller**. Migrating data in a storage array that includes a plurality of storage devices and a plurality of write buffer devices. US Patent 9,507,532, issued Nov. 29, 2016. Assignee: Pure Storage.
- PA45. Christopher Golden, John Colgrove, **Ethan L. Miller**, Malcolm Sharpe, Steve Hodgson. Utilizing unmapped and unknown states in a replicated storage system. US Patent 9,489,132, issued Nov. 8, 2016. Assignee: Pure Storage.
- PA44. John Colgrove, John Hayes, **Ethan Miller**, Feng Wang. Logical sector mapping in a flash storage array. US Patent 9,454,477, issued Sep. 27, 2016. Assignee: Pure Storage.
- PA43. John Colgrove, John Hayes, **Ethan Miller**, Feng Wang. Logical sector mapping in a flash storage array. US Patent 9,454,476, issued Sep. 27, 2016. Assignee: Pure Storage.
- PA42. Benjamin P. Borowiec, Jimmy T. Hu, **Ethan L. Miller**, Terence W. Noonan, Constantine P. Sapuntzakis, Neil A. Vachharajani, Daquan, Zuo. Storage array access control from cloud-based user authorization and authentication. US Patent 9,444,822, issued Sep. 13, 2016. Assignee: Pure Storage.
- PA41. John Colgrove, **Ethan Miller**, John Hayes, Cary Sandvig, Christopher Golden, Jianting Cao. Safety for volume operations. US Patent 9,436,720, issued Sep. 6, 2016. Assignee: Pure Storage.
- PA40. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of reconstructive I/O read operations in a storage environment. US Patent 9,436,396, issued Sep. 6, 2016. Assignee: Pure Storage.
- PA39. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of I/O writes in a storage environment. US Patent 9,423,967, issued August 23, 2016. Assignee: Pure Storage.
- PA38. **Ethan Miller**, John Colgrove, John Hayes, Cary Sandvig. Fractal layout of data blocks across multiple devices. US Patent 9,405,486, issued August 2, 2016. Assignee: Pure Storage.
- PA37. John Colgrove, **Ethan Miller**, John Hayes, Cary Sandvig, Christopher Golden, Grigori Inozemtsev. Performing copies in a storage system. US Patent 9,361,035, issued June 7, 2016. Assignee: Pure Storage.
- PA36. John Colgrove, John Hayes, Bo Hong, **Ethan Miller**. Distributed multi-level protection in a raid array based storage system. US Patent 9,348,696, issued May 24, 2016. Assignee: Pure Storage.
- PA35. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of reactive I/O operations in an storage environment. US Patent 9,304,694, issued April 5, 2016. Assignee: Pure Storage.
- PA34. Benjamin P. Borowiec, Jimmy T. Hu, **Ethan L. Miller**, Terence W. Noonan, Constantine P. Sapuntzakis, Neil A. Vachharajani, Daquan Zuo. Providing authorization and authentication in a cloud for a user of a storage array. US Patent 9,300,600, issued March 29, 2016. Assignee: Pure Storage.
- PA33. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of I/O in an SSD environment. US Patent 9,298,376, issued March 29, 2016. Assignee: Pure Storage, Inc.
- PA32. John Colgrove, John Hayes, **Ethan Miller**. Cary Sandvig, Joseph S. Hasbani, Feng Wang. Garbage collection in a storage system. US Patent 9,251,066 issued Feb. 2, 2016. Assignee: Pure Storage.
- PA31. John Colgrove, John Hayes, Bo Hong, **Ethan Miller**. Offset protection data in a RAID array. US Patent 9,244,769, issued January 26, 2016. Assignee: Pure Storage.
- PA30. John Colgrove, John Hayes, **Ethan Miller**, Cary Sandvig. Mapping in a storage system. US Patent 9,239,688, issued January 19, 2016. Assignee: Pure Storage.
- PA29. John Colgrove, John Hayes, Bo Hong, **Ethan Miller**. Reconstruct reads in a RAID array with dynamic geometries. US Patent 9,229,808, issued January 5, 2016. Assignee: Pure Storage.

- PA28. **Ethan Miller**, John Colgrove, John Hayes. Efficient techniques for aligned fixed-length compression. US Patent 9,077,368, issued July 7, 2015. Assignee: Pure Storage.
- PA27. John Colgrove, John Hayes, **Ethan Miller**, Joseph S. Hasbani, Cary Sandvig. Method for maintaining multiple fingerprint tables in a deduplicating storage system. US Patent 9,069,786, issued June 30, 2015. Assignee: Pure Storage.
- PA26. John Colgrove, **Ethan Miller**, John Hayes, Cary Sandvig, Christopher Golden, Jianting Cao, Grigori Inozemtsev. Performing copies in a storage system. US Patent 9,063,967, issued June 23, 2015. Assignee: Pure Storage.
- PA25. John Colgrove, John Hayes, Bo Hong, **Ethan Miller**. Intra-device data protection in a RAID array. US Patent 9,058,116, issued June 16, 2015. Assignee: Pure Storage.
- PA24. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of I/O writes in a storage environment. US Patent 9,037,827, issued May 19, 2015. Assignee: Pure Storage.
- PA23. John Colgrove, John Hayes, **Ethan Miller**, Variable length encoding in a storage system, US Patent 8,954,710, issued February 10, 2015. Assignee: Pure Storage.
- PA22. John Colgrove, John Hayes, **Ethan Miller**, Joseph S. Hasbani, Cary Sandvig. Method for removing duplicate data from a storage array. US Patent 8,930,307, issued Jan. 6, 2015. Assignee: Pure Storage.
- PA21. John Colgrove, John Hayes, **Ethan Miller**, Cary Sandvig, Joseph S. Hasbani, Feng Wang. Garbage collection in a storage system. US Patent 8,886,691 issued Nov. 11, 2014. Assignee: Pure Storage.
- PA20. John Davis, **Ethan Miller**, Brian Gold, John Colgrove, Peter Vajgel, John Hayes, Alex Ho. Data placement based on data properties in a tiered storage device system. US Patent 8,874,835, issued Oct. 28, 2014. Assignee: Pure Storage.
- PA19. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer, Scheduling of reconstructive I/O read operations in a storage environment. US Patent 8,862,820, issued October 14, 2014. Assignee: Pure Storage.
- PA18. John Colgrove, John Hayes, **Ethan Miller**, Feng Wang, Logical sector mapping in a flash storage array. US Patent 8,856,489, issued Oct. 7, 2014. Assignee: Pure Storage.
- PA17. John Colgrove, John Hayes, Bo Hong, **Ethan Miller**, Intra-device data protection in a RAID array. US Patent 8,832,373, issued Sep. 9, 2014. Assignee: Pure Storage.
- PA16. John Colgrove, John Hayes, **Ethan Miller**, Cary Sandvig, Mapping in a storage system. US Patent 8,806,160, issued August 12, 2014. Assignee: Pure Storage.
- PA15. John Colgrove, John Hayes, **Ethan Miller**, Variable length encoding in a storage system, US Patent 8,793,467, issued July 29, 2014. Assignee: Pure Storage.
- PA14. John Colgrove, John Hayes, **Ethan Miller**, Feng Wang, Logical sector mapping in a flash storage array, US Patent 8,788,788, issued July 22, 2014. Assignee: Pure Storage.
- PA13. John Colgrove, John Hayes, Bo Hong, **Ethan Miller**, Adaptive RAID for an SSD environment. US Patent 8,775,868, issued July 8, 2014. Assignee: Pure Storage.
- PA12. **Ethan Miller**, John Colgrove, John Hayes. Multi-drive cooperation to generate an encryption key, US Patent 8,745,415, issued June 3, 2014. Assignee: Pure Storage.
- PA11. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of reactive I/O operations in an storage environment. US Patent 8,732,426, issued May 20, 2014. Assignee: Pure Storage.
- PA10. **Ethan Miller**, John Colgrove, John Hayes, Cary Sandvig, Fractal layout of data blocks across multiple devices. US Patent 8,719,540, issued May 6, 2014. Assignee: Pure Storage.
- PA9. John Colgrove, John Hayes, **Ethan Miller**, Feng Wang, Logical sector mapping in a flash storage array. US Patent 8,645,664, issued Feb. 4, 2014. Assignee: Pure Storage.
- PA8. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of I/O writes in a storage environment, environment. US Patent 8,645,657, issued Feb. 4, 2014. Assignee: Pure Storage.
- PA7. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of I/O in an SSD environment. US Patent 8,589,655, issued Nov. 19, 2013. Assignee: Pure Storage, Inc.

- PA6. John Colgrove, John Hayes, **Ethan Miller**, Joseph S. Hasbani, Cary Sandvig. Method for maintaining multiple fingerprint tables in a deduplicating storage system. US Patent 8,589,640, issued Nov. 19, 2013. Assignee: Pure Storage.
- PA5. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of reconstructive I/O read operations in a storage environment. US Patent 8,589,625, issued Nov. 19, 2013.
- PA4. John Colgrove, John Hayes, **Ethan Miller**, Cary Sandvig, Joseph S. Hasbani, Feng Wang. Garbage collection in a storage system. US Patent 8,527,544, issued Sep. 3, 2013. Assignee: Pure Storage.
- PA3. **Ethan Miller**, John Colgrove, John Hayes. Efficient techniques for aligned fixed-length compression. US Patent 8,497,788, issued July 30, 2013. Assignee: Pure Storage.
- PA2. John Colgrove, John Hayes, Bo Hong, Feng Wang, **Ethan Miller**, Craig Harmer. Scheduling of I/O writes in a storage environment. US Patent 8,468,318, issued June 18, 2013. Assignee: Pure Storage.
- PA1. John Colgrove, John Hayes, Bo Hong, **Ethan Miller**. Intra-device data protection in a RAID array, US Patent 8,463,991, issued June 11, 2013. Assignee: Pure Storage.

Technical Reports

- T25. Daniel Bittman[‡], Matthew Bryson[‡], Yuanjiang Ni[‡], Arjun Govindjee*, Isaak Cherdak*, Pankaj Mehra, Darrell D. E. Long, **Ethan L. Miller**, “Twizzler: An Operating System for Next-Generation Memory Hierarchies”, Technical Report UCSC-SSRC-17-01, December 2017.
- T24. Shesha Sreenivasamurthy[‡], **Ethan L. Miller**, “SIVSHM: Secure Inter-VM Shared Memory”, Technical Report UCSC-SSRC-16-01, May 2016.
- T23. James S. Plank, **Ethan L. Miller**, Kevin M. Greenan, Benjamin A. Arnold*, John A. Burnum*, Adam W. Disney*, Allen C. McBride*, “GF-Complete: A Comprehensive Open Source Library for Galois Field Arithmetic”, Technical Report UT-CS-13-716, Computer Science Department, University of Tennessee, October 2013.
- T22. Avani Wildani[‡], **Ethan L. Miller**, Ian F. Adams, Darrell D. E. Long, “PERSES: Data Layout for Low Impact Failures”, Technical Report UCSC-SSRC-12-06, September 2012.
- T21. Avani Wildani[‡], **Ethan L. Miller**, Ohad Rodeh, “HANDS: A Heuristically Arranged Non-Backup In-line Deduplication System”, Technical Report UCSC-SSRC-12-03, March 2012.
- T20. Brian Madden*, Ian Adams[‡], Joel Frank[‡], **Ethan L. Miller**, “Analyzing User Behavior: A Trace Analysis of the NCAR Archival Storage System”, Technical Report UCSC-SSRC-12-02, March 2012.
- T19. Aleatha Parker-Wood*, Darrell D. E. Long, **Ethan L. Miller**, Margo Seltzer, Daniel Tunkelang, “Making Sense of File Systems Through Provenance and Rich Metadata”, Technical Report UCSC-SSRC-12-01, March 2012.
- T18. Ian F. Adams[‡], **Ethan L. Miller**, David S. H. Rosenthal, “Using Storage Class Memory for Archives with DAWN, a Durable Array of Wimpy Nodes”, Technical Report UCSC-SSRC-11-07, October 2011.
- T17. Brian Madden*, Ian F. Adams[‡], Mark W. Storer, **Ethan L. Miller**, Darrell D. E. Long, Thomas Kroeger, “Provenance Based Rebuild: Using Data Provenance to Improve Reliability”, Technical Report UCSC-SSRC-11-04, May 2011.
- T16. Ian F. Adams[‡], Mark W. Storer, and **Ethan L. Miller**, “Analysis of Workload Behavior in Scientific and Historical Long-Term Data Repositories”, Technical Report UCSC-SSRC-11-01, March 2011.
- T15. Andrew W. Leung[‡], Ian F. Adams[‡], **Ethan L. Miller**, “Magellan: A Searchable Metadata Architecture for Large-Scale File Systems”, Technical Report UCSC-SSRC-09-07, November 2009.
- T14. Andrew W. Leung[‡], Aleatha Parker-Wood[‡], **Ethan L. Miller**, “Copernicus: A Scalable, High-Performance Semantic File System”, Technical Report UCSC-SSRC-09-06, October 2009.
- T13. Avani Wildani[‡], Thomas J. E. Schwarz, **Ethan L. Miller**, Darrell D. E. Long, “Protecting Against Rare Event Failures in Archival Systems”, Technical Report UCSC-SSRC-09-03, April 2009.
- T12. Sasha Ames*, Carlos Maltzahn, **Ethan L. Miller**, “Quasar: A Scalable Naming Language for Very Large File Collections”, Technical Report UCSC-SSRC-08-04, October 2008.
- T11. Sasha Ames*, Carlos Maltzahn, **Ethan L. Miller**, “QUASAR: Interaction with File Systems Using a Query and Naming Language”, Technical Report UCSC-SSRC-08-03, September 2008.

- T10. Andrew W. Leung[‡], Minglong Shao, Timothy Bisson, Shankar Pasupathy, **Ethan L. Miller**, “Spyglass: Fast, Scalable Metadata Search for Large-Scale Storage Systems”, Technical Report UCSC-SSRC-08-01, Storage Systems Research Center, University of California, Santa Cruz, May 2008.
- T9. Kevin M. Greenan[‡], **Ethan L. Miller**, Thomas J. E. Schwarz, S. J., “Analysis and Construction of Galois Fields for Efficient Storage Reliability”, Technical Report UCSC-SSRC-07-09, Storage Systems Research Center, University of California, Santa Cruz, August 2007.
- T8. Mark W. Storer[‡], Kevin Greenan[‡], **Ethan L. Miller**, and Kaladhar Voruganti, “POTSHARDS: Secure Long-Term Archival Storage Without Encryption”, Technical Report UCSC-SSRC-06-03, Storage Systems Research Center, University of California, Santa Cruz, September 2006.
- T7. Sage A. Weil*, Scott A. Brandt, **Ethan L. Miller**, and Carlos Maltzahn, “CRUSH: Controlled, Scalable And Decentralized Placement Of Replicated Data”, Technical Report SSRC-06-02, Storage Systems Research Center, University of California, Santa Cruz, March 2006.
- T6. Sage A. Weil*, Feng Wang*, Qin Xin[‡], Scott A. Brandt, **Ethan L. Miller**, Darrell D. E. Long, and Carlos Maltzahn, “Ceph: a Scalable Object-Based Storage System”, Technical Report SSRC-06-01, Storage Systems Research Center, University of California, Santa Cruz, March 2006.
- T5. Geoff Kuenning and **Ethan L. Miller**, “Anonymization Techniques for URLs and Filenames”, Technical Report UCSC-CRL-03-05, Storage Systems Research Center, University of California, Santa Cruz, September 2003.
- T4. Nathan K. Edel[‡], **Ethan L. Miller**, Karl S. Brandt*, and Scott A. Brandt, “Measuring the Compressibility of Metadata and Small Files for Disk/NVRAM Hybrid Storage Systems”, Technical Report UCSC-CRL-03-04, Storage Systems Research Center, University of California, Santa Cruz, July 2003.
- T3. Timothy J. Gibson[‡] and **Ethan L. Miller**, “Long-Term File Activity in Diverse UNIX Environments”, Technical Report TR-CS-97-07, University of Maryland Baltimore County, October 1997.
- T2. R. Scott Cost*, Ian Soboroff*, Jeegar Lakhani*, Tim Finin, **Ethan Miller**, and Charles Nicholas, “TKQML: A KQML Extension to Tcl”, Technical Report TR-CS-97-04, University of Maryland Baltimore County, July 1996.
- T1. **Ethan Miller** and Jeffrey Hollingsworth, “Using Content-Derived Names for Caching and Software Distribution”, Technical Report TR-CS-96-08, University of Maryland Baltimore County, July 1996. Also available as UMIACS Technical Report TR-96-55.

Software

- SW5. `gferasure`: A high-performance Galois field and erasure code library written in C++ that leverages vector instructions in Intel and ARM processors. This software supersedes `GF-Complete`.
- SW4. `GF-Complete`: A high-performance Galois field library written in C that leverages specialized instruction sets in Intel processors. This software was co-authored with James Plank (University of Tennessee) and Kevin Greenan (EMC). The library is documented in a paper published in FAST 2013.
- SW3. `GaloisField`: A high-performance Galois field library written in C/C++ with an efficient Python interface. This software was co-authored with Kevin Greenan, one of my Ph.D. students.
- SW2. `DLXOS`: A CPU simulator and operating system used in undergraduate operating systems classes at the University of California, Santa Cruz, the University of Arizona, Purdue, the University of Maryland Baltimore County, and elsewhere.
- SW1. `esim`: A simple digital logic design language and simulator. Used for teaching computer architecture at the University of Maryland Baltimore County and elsewhere.

PROFESSIONAL ACTIVITIES

Work-in-Progress Posters and Presentations

- WP21. Matt Bryson[‡], Daniel Bittman[‡], Darrell Long, **Ethan Miller**, “Twizzler: The Design and Implementation of a NVM Aware OS”, 2017 Non-Volatile Memories Workshop (NVMW 2017), San Diego, CA, March 2017.

- WP20. Matheus Ogleari*, Jishen Zhao, **Ethan Miller**, “Relaxing Persistent Memory Constraints with Hardware-Driven Undo+Redo Logging”, 2017 Non-Volatile Memories Workshop (NVMW 2017), San Diego, CA, March 2017.
- WP19. Anastasia McTaggart[‡], **Ethan L. Miller**, Sinjoni Mukhopadhyay[‡], “Clinker: Reconstructing Sharded Data Stores Efficiently”, work-in-progress presentation at the 14th Conference on File and Storage Technologies (FAST 2016), Santa Clara, CA, February 2016.
- WP18. Stephanie N. Jones*, Ahmed Amer, Rekha Pitchumani[‡], Darrell D. E. Long, **Ethan L. Miller**, “Data Layouts to Reduce Data Movement in Shingled Write Disks” work-in-progress and poster presentation at the 13th Conference on File and Storage Technologies (FAST 2015), Santa Clara, CA, February 2015.
- WP17. Joel C. Frank*, Shayna M. Frank[‡], Lincoln Thurlow[‡], Thomas M. Kroege, **Ethan L. Miller**, Darrell D. E. Long, “Searching a Secret Split Datastore”, work-in-progress and poster presentation at the 13th Conference on File and Storage Technologies (FAST 2015), Santa Clara, CA, February 2015.
- WP16. Preeti Gupta[‡], Avani Wildani, **Ethan L. Miller**, Darrell D. E. Long, David S. H. Rosenthal “An Economic Argument For a Long Planning Horizon in Archival Storage”, poster presentation at the 13th Conference on File and Storage Technologies (FAST 2015), Santa Clara, CA, February 2015.
- WP15. Shesha Sreenivasamurthy[‡] and **Ethan L. Miller**, “VMOFS: Diskless and Efficient Object File System for Virtual Machines”, poster presentation at the 12th Conference on File and Storage Technologies (FAST 2014), Santa Clara, CA, February 2014.
- WP14. Ian F. Adams[‡], **Ethan L. Miller**, Mark W. Storer, Avani Wildani[‡], Yangwook Kang[‡], “Improved Analysis and Trace Validation Using Metadata Snapshots”, poster presentation at the 11th Conference on File and Storage Technologies (FAST 2013), San Jose, CA, February 2013.
- WP13. Daniel C. Rosenthal[‡], David S. H. Rosenthal, **Ethan L. Miller**, Ian F. Adams[‡], Mark W. Storer, and Erez Zadok, “Toward an Economic Model of Long-Term Storage”, poster and work-in-progress presentation at the 10th Conference on File and Storage Technologies (FAST 2012), San Jose, CA, February 2012.
- WP12. Rekha Pitchumani[‡], Yulai Xie*, Andy Hospodor, Ahmed Amer, and **Ethan L. Miller**, “Emulating a Shingled Write Disk”, poster and work-in-progress presentation at the 10th Conference on File and Storage Technologies (FAST 2012), San Jose, CA, February 2012.
- WP11. Andy Hospodor, Ahmed Amer, **Ethan L. Miller**, Darrell D. E. Long, Rekha Pitchumani[‡], Yangwook Kang[‡], and Yulai Xie*, “A Unified Object Oriented Storage Architecture”, poster and work-in-progress presentation at the 10th Conference on File and Storage Technologies (FAST 2012), San Jose, CA, February 2012.
- WP10. Ian F. Adams[‡] and **Ethan L. Miller**, “Challenges in Long-Term System Logging”, poster and work-in-progress presentation at the 10th Conference on File and Storage Technologies (FAST 2012), San Jose, CA, February 2012.
- WP9. Avani Wildani[‡] and **Ethan L. Miller**, “Grouping Data for Faster Rebuilds: The Art of Failing Silently”, poster and work-in-progress presentation at the 10th Conference on File and Storage Technologies (FAST 2012), San Jose, CA, February 2012.
- WP8. Ian F. Adams[‡], Mark W. Storer, and **Ethan L. Miller**, “Analysis of Workload Behavior in Scientific and Historical Long-Term Data Repositories”, poster at the 9th Conference on File and Storage Technologies (FAST 2011), San Jose, CA, February 2011.
- WP7. Yangwook Kang[‡], Jingpei Yang[‡], and **Ethan L. Miller**, “Object-based SCM: An Efficient Interface for Storage Class Memories”, poster at the 9th Conference on File and Storage Technologies (FAST 2011), San Jose, CA, February 2011.
- WP6. Aleatha Parker-Wood[‡], Christina Strong*, **Ethan L. Miller**, and Darrell D. E. Long, “Security Aware Partitioning for Efficient File Systems Search”, work-in-progress presentation and poster at the 8th Conference on File and Storage Technologies (FAST 2010), San Jose, CA, February 2010.
- WP5. Avani Wildani[‡] and **Ethan L. Miller**, “Probabilistic Reputation for Personal Trust Networks”, work-in-progress presentation and poster at the 7th Conference on File and Storage Technologies (FAST 2009), San Francisco, CA, February 2009.
- WP4. Sasha Ames[‡], Carlos Maltzahn, and **Ethan L. Miller**, “A File System Query Language”, poster at the 21st Symposium on Operating Systems Principles (SOSP 2007), Stevenson, WA, October 2007.

- WP3. Mark W. Storer[‡], Kevin Greenan[‡], and **Ethan L. Miller**, “Secure Long-Term Archival Storage with POTSHARDS”, work-in-progress presentation at the 5th Conference on File and Storage Technologies (FAST 2007), San Jose, CA, February 2007.
- WP2. Kevin Greenan[‡] and **Ethan L. Miller**, “CompulsiveFS: Making NVRAM Suitable for Extremely Reliable Storage”, work-in-progress presentation at the 5th Conference on File and Storage Technologies (FAST 2007), San Jose, CA, February 2007.
- WP1. Andrew Leung[‡] and **Ethan L. Miller**, “Scaling Security for Big, Parallel File Systems”, work-in-progress presentation at the 5th Conference on File and Storage Technologies (FAST 2007), San Jose, CA, February 2007.

Conference Organization

- 2018 **Program Committee:** 16th Conference on File and Storage Technologies (FAST 2018);
26th IEEE/ACM Conference on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2018);
HotStorage 2018;
2018 Non-Volatile Memories Workshop (NVMW 2018).
Steering Committee: 11th Annual Israeli Experimental Systems Conference (SYSTOR 2018);
Symposium on Operating Systems Principles.
- 2017 **Program Committee:** 29th International Conference on Scientific and Statistical Database Management (SSDBM 2017);
9th USENIX Workshop on Hot Topics in Cloud Computing (HotCloud 2017).
Steering Committee: 10th Annual Israeli Experimental Systems Conference (SYSTOR 2017).
- 2016 **Program Committee:** 14th Conference on File and Storage Technologies (FAST 2016);
2016 Non-Volatile Memories Workshop (NVMW 2016).
36th International Conference on Distributed Computing Systems (ICDCS 2016).
Steering Committee: 9th Annual Israeli Experimental Systems Conference (SYSTOR 2016).
- 2015 **Program Committee:** 35th International Conference on Distributed Computing Systems (ICDCS 2015);
7th Workshop on Hot Topics in Storage and File Systems (HotStorage '15);
23rd IEEE/ACM Conference on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2015);
2015 Non-Volatile Memories Workshop (NVMW 2015).
General Chair: 25th Symposium on Operating Systems Principles (SOSP 2015).
Steering Committee: 8th Annual Israeli Experimental Systems Conference (SYSTOR 2015);
31st Conference on Mass Storage Systems and Technologies (MSST 2015).
- 2014 **Program Committee:** 12th Conference on File and Storage Technologies (FAST 2014);
34th International Conference on Distributed Computing Systems (ICDCS 2014);
IEEE Cluster 2014;
30th Conference on Mass Storage Systems and Technologies (MSST 2014);
7th Annual Israeli Experimental Systems Conference (SYSTOR 2014);
2014 Non-Volatile Memories Workshop (NVMW 2014).
Steering Committee: 7th Annual Israeli Experimental Systems Conference (SYSTOR 2014);
30th Conference on Mass Storage Systems and Technologies (MSST 2014).
- 2013 **Program Committee:** 11th Conference on File and Storage Technologies (FAST 2013);
29th IEEE Conference on Mass Storage Systems and Technologies (MSST 2013);
19th IEEE International Conference on Parallel and Distributed Systems (ICPADS 2013);
2013 Non-Volatile Memories Workshop (NVMW 2013);
SNIA Storage Developers Conference (SDC), New Thinking Track.
Steering Committee: 6th Annual Israeli Experimental Systems Conference (SYSTOR 2013);
29th IEEE Conference on Mass Storage Systems and Technologies (MSST 2013).
- 2012 **Co-organizer:** Dagstuhl workshop: “Is the Future of Preservation Cloudy?”, November, 2012.
Program co-Chair: 28th IEEE Conference on Mass Storage Systems and Technologies (MSST 2012).
Program Committee: International Conference for High Performance Computing, Networking, Storage and Analysis (SC12);

- 5th Annual Israeli Experimental Systems Conference (SYSTOR 2012);
 3rd International Green Computing Conference (IGCC '12);
 20th IEEE/ACM Conference on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2012);
 7th IEEE International Conference on Networking, Architecture, and Storage (NAS 2012);
 9th International Conference on Preservation of Digital Objects (iPRES 2012).
- Steering Committee:** 5th Annual Israeli Experimental Systems Conference (SYSTOR 2012);
 28th IEEE Conference on Mass Storage Systems and Technologies (MSST 2012).
- 2011 **Program Committee:** 27th IEEE Conference on Mass Storage Systems and Technologies (MSST 2011);
 The 4th Annual Israeli Experimental Systems Conference (SYSTOR 2011);
 19th IEEE/ACM Conference on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2011);
 IEEE Cluster 2011 Conference;
 2nd Workshop on Managing Systems via Log Analysis and Machine Learning Techniques (SLAML 2011);
 8th International Conference on Preservation of Digital Objects (iPRES 2011);
 7th Petascale Data Storage Workshop (PDSW 2011).
- 2010 **Program co-Chair:** The Israeli Experimental Systems Conference (SYSTOR 2010).
Program co-Chair: First USENIX Workshop on Sustainable Information Technology (SustainIT '10).
Program Committee: International Conference for High Performance Computing, Networking, Storage and Analysis (SC10);
 26th IEEE Conference on Mass Storage Systems and Technologies (MSST 2010);
 18th IEEE/ACM Conference on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2010);
 Workshop on Managing Systems via Log Analysis and Machine Learning Techniques (SLAML 2010);
 7th International Conference on Preservation of Digital Objects (iPRES 2010);
- 2009 **Steering Committee:** 26th IEEE Conference on Mass Storage Systems and Technologies (MSST 2010).
Program Committee: 7th Conference on File and Storage Technologies (FAST 2009);
 17th IEEE/ACM Conference on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2009);
 The Israeli Experimental Systems Conference (SYSTOR 2009);
 1st Workshop on Hot Topics in Storage and File Systems (HotStorage '09);
 5th Workshop on Hot Topics in System Dependability (HotDep 2009).
- 2008 **Program co-Chair:** 16th IEEE/ACM Conference on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2008);
Program Committee: 28th International Conference on Distributed Computing Systems (ICDCS 2008);
 4th ACM Workshop on Storage Survivability and Security (StorageSS 2008);
 5th IEEE International Workshop on Storage Network Architecture and Parallel I/O (SNAPI);
 1st International Workshop on Storage and I/O Virtualization, Performance, Energy, Evaluation and Dependability (SPEED 2008);
 3rd International Workshop on Software Support for Portable Storage (IWSSPS 2008).
- 2007 **Program Chair:** 24th IEEE Conference on Mass Storage Systems and Technologies (MSST 2007).
Area Vice-Chair: 36th International Conference on Parallel Processing (ICPP 2007), Data-Intensive Computing track.
Program Committee: 3rd ACM Workshop on Storage Survivability and Security (StorageSS 2007);
 4th International IEEE Security in Storage Workshop (SISW 2007).
- 2006 **Program co-Chair:** 2nd ACM Workshop on Storage Survivability and Security (StorageSS 2006).
Program Committee: 23rd IEEE / 14th NASA Goddard Conference on Mass Storage Systems and Technologies (MSST 2006);
 14th IEEE/ACM Conference on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2006);

- 7th Workshop on Distributed Data and Structures (WDAS 2006);
 2nd International Workshop on Software Support for Portable Storage (IWSSPS 2006).
- 2005 **Program Committee:** 13th IEEE/ACM Conference on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2005);
 22nd IEEE / 13th NASA Goddard Conference on Mass Storage Systems and Technologies (MSST 2005);
 International Symposium on Emergence of Globally Distributed Data [also served as publications chair];
 International Workshop on Software Support for Portable Storage (IWSSPS 2005);
 1st ACM Workshop on Storage Survivability and Security (StorageSS);
 3rd International IEEE Security in Storage Workshop;
- 2004 **Invited Talks co-chair:** 2005 USENIX Technical Conference.
Program Committee: 21st IEEE / 12th NASA Goddard Conference on Mass Storage Systems and Technologies (MSST 2004);
 2nd Intelligent Storage Workshop;
 6th Workshop on Distributed Data and Systems (WDAS 2004);
 12th IEEE/ACM Conference on Modelling, Analysis and Simulation of Computer and Telecommunication Systems (MASCOTS 2004), [also served as publications chair];
 Supercomputing (SC) 2004.
- 2003 **Program Committee:** 20th IEEE / 11th NASA Goddard Conference on Mass Storage Systems and Technologies (MSST 2003) [also served as publications chair];
 2nd International IEEE Security in Storage Workshop.
- 2002 **Steering Committee:** HotOS-IX: Ninth Workshop on Hot Topics in Operating Systems.
Program Committee: 1st File and Storage Technologies Conference (FAST 2002) [also served as publications chair];
 19th IEEE Mass Storage System Symposium /
 10th NASA Goddard Mass Storage and Technologies Conference;
 1st International IEEE Security in Storage Workshop;
 IEEE International Performance, Computing, and Communications Conference.
- 2001 **Program Committee:** 18th IEEE Mass Storage System Symposium / 9th NASA Goddard Mass Storage and Technologies Conference.
- 2000 **Program Committee:** 17th IEEE Mass Storage System Symposium / 8th NASA Goddard Mass Storage and Technologies Conference.
- 1999 **Program Committee:** 16th IEEE Mass Storage System Symposium / 7th NASA Goddard Mass Storage and Technologies Conference [also served as publications chair].
- 1998 **Program Committee:** 15th IEEE Mass Storage System Symposium / 6th NASA Goddard Mass Storage and Technologies Conference.
- 1996 **Program Committee:** Workshop on I/O in Parallel and Distributed Systems (IOPADS).

Reviewer of Technical Papers and Proposals

- 2018 National Science Foundation (panel review).
- 2017 *ACM Transactions on Storage*.
- 2016 National Science Foundation (panel review); *IEEE Transactions on Parallel and Distributed Systems*.
- 2015 National Science Foundation (panel review); 13th Conference on File and Storage Technologies (FAST 2015).
- 2014 International Symposium on Network Coding (NetCod 2014); *IEEE Transactions on Parallel and Distributed Systems*; *ACM Transactions on Information and System Security*; *ACM Transactions on Storage*.
- 2013 National Science Foundation (*ad hoc* proposal review); *IEEE Transactions on Dependable and Secure Computing*; *ACM Computing Surveys*; *ACM Transactions on Storage*.

- 2012 *ACM Transactions on Storage*; *IEEE Internet Computing*; 19th International Symposium on High Performance Computer Architecture (HPCA-19).
- 2011 National Science Foundation (SBIR panel); *ACM Transactions on Storage*; *IEEE Transactions on Computers*; *IEEE Transactions on Parallel and Distributed Systems*; *IEEE Transactions on Information Theory*; Department of Energy (ASCR proposal panel); John Wiley & Sons.
- 2010 *IEEE Transactions on Dependable and Secure Computing*; *ACM Transactions on Storage*; *ACM Transactions on Information and System Security*; *IEEE Transactions on Knowledge and Data Engineering*; 8th Conference on File and Storage Technologies (FAST); National Science Foundation (*ad hoc* review).
- 2009 *IEEE Transactions on Knowledge and Data Engineering*; *Journal of Parallel and Distributed Computing*; National Science Foundation (SBIR panel); National Science Foundation (CAREER panel); UC Discovery Grant; Addison Wesley; John Wiley & Sons.
- 2008 *IEEE Transactions on Parallel and Distributed Systems*; *ETRI (Electronics and Telecommunications Research Institute) Journal*; 6th Conference on File and Storage Technologies (FAST); British Computer Society Distinguished Dissertation Award; National Science Foundation (CISE panel).
- 2007 *IEEE Transactions on Parallel and Distributed Systems*; 5th Conference on File and Storage Technologies (FAST); *Journal of Systems and Software*; *IBM Journal of Research and Development*; IEEE Wireless Communications and Networking Conference; US-Israel Bi-national Science Foundation; National Science Foundation (CISE panel); National Science Foundation (CAREER panel); UC Discovery Grant.
- 2006 Conference on Dependable Systems and Networks (DSN); 7th Conference on Operating Systems Design and Implementation (OSDI); National Science Foundation (CAREER panel); National Science Foundation (SBIR panels).
- 2005 *IEEE Transactions on Computers*; 4th Conference on File and Storage Technologies (FAST); 19th International Symposium on Distributed Computing (DiSC 2005); National Science Foundation (CISE panel).
- 2004 3rd Conference on File and Storage Technologies (FAST); Conference on Dependable Systems and Networks (DSN); 6th Symposium on Operating Systems Design and Implementation (OSDI); *Software—Practice and Experience*; *ACM Transactions on Computer Systems*; National Science Foundation (CISE panel).
- 2003 *IEEE Transactions on Parallel and Distributed Systems*; Usenix Technical Conference; 2nd Conference on File and Storage Technologies; SC2003; National Science Foundation (SBIR panel).
- 2002 *IEEE Transactions on Computers*, *IEEE Transactions on Parallel and Distributed Systems*, Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS), 5th Symposium on Operating Systems Design and Implementation (OSDI), Usenix Annual Technical Conference, National Science Foundation (SBIR panel).
- 2001 Usenix Annual Technical Conference; *IEEE Transactions on Computers*; National Science Foundation (ITR panel, SBIR panel).
- 1990–2000 National Science Foundation (panel reviewer); *ACM Transactions on Computer Systems*; *IEEE Computer*; International Symposium on Computer Architecture; *Journal of Parallel and Distributed Computing*; Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS); Symposium on Operating Systems Design and Implementation (OSDI); USENIX Annual Technical Conference; Oxford University Press.

Membership in Professional Associations

- 1995–present Member, Usenix Association.
- 1990–present Association for Computing Machinery: Distinguished Member (2013).
- 1990–present IEEE Computer Society: Senior Member (2001), Fellow (2015).
- 1987–present Member, Sigma Xi.

Service to Professional Associations

- 2017 IEEE Computer Society Fellows Evaluation Committee.
- 2001–2008 Chair, *IEEE Technical Committee on Operating Systems and Applications Environments*.
- 1996–2013 Member, Executive Committee, *IEEE Technical Committee on Mass Storage Systems*.
- 1995–2000 University Liaison for the Usenix Association.

Consulting & Expert Witness Activity

- 2013 Consulting expert, Arnold Porter LLP
- 2009–present Consultant / Research Scientist, Pure Storage
- 2010–2011 Consulting expert, Foley Lardner LLP
- 2009–2011 Consulting and testifying expert, Sidley Austin LLP
- 2008–2009 Consulting expert, Sheppard Mullin Richter & Hampton LLP
- 2007 Hewlett Packard Laboratories
- 2006–2007 Expert witness, Fish & Richardson
- 2005–2006 Veritas (now Symantec) Corporation
- 2003 Hewlett Packard Laboratories
- 2001–2005 Expert witness, Bartlit, Beck, Herman, Palenchar & Scott
- 2000 Expert witness, Fish & Richardson
- 1998–2001 Expert witness, Hopgood, Calimafde, Judlowe & Mondolino
- 1998 Web site architect, Ambleside Logic

Editorial Duties

- 2014–2016 Associate Editor, *ACM Transactions on Storage*.
- 2009–2014 Associate Editor, *IEEE Transactions on Computers*.

Advisory Boards

- 2011–present Technical Advisory Board, Chronicle of Life
- 2011–2015 Technical Advisory Board, 8kpc
- 2010–2011 Technical Advisory Board, Pancetera (purchased by Quantum in 2011)

Invited Talks

This list contains details for recent talks only.

- 2017 Oct “Rethinking the System Stack for Persistent Memories”, Seagate Technology Academic Summit, Fremont, CA.
- 2017 Sep “CAPES: Unsupervised Storage Performance Tuning Using Neural Network-Based Deep Reinforcement Learning”, CERN, Geneva, Switzerland.
- 2017 Aug “QLC and the Future of Flash Storage”, Huawei, Chengdu, China.
- 2016 Aug “Performance and Durability: Storage Directions for the Next Ten Years”, Veritas, Mountain View, CA.
- 2016 Jun “Leveraging Flash Storage Characteristics for High-Performance Block Storage”, IBM Haifa Research Laboratory, Haifa, Israel.
- 2016 Apr “Leveraging Flash Storage Characteristics for High-Performance Block Storage”, Northeastern University, Boston, MA.
- 2016 Feb “The Real Dangers in Cybersecurity”, Temple Beth El, Aptos, CA.
- 2016 Jan “Rethinking Benchmarks for Non-Volatile Memory Storage Systems”, NVM Summit—Convergence of Storage and Memory—Developing the Needed Ecosystem, San Jose, CA.
- 2015 Nov “Re-architecting the Systems Stack for Byte-Addressable NVRAM”, Sandisk, Milpitas, CA.
- 2015 Sep “CRSS & SSRC Overview”, SK Hynix, San Jose, CA.
- 2014 Sep “Muninn: a Versioning Flash Key-Value Store Using an Object-Based Storage Model”, Samsung, Milpitas, CA.

- 2014 Jul “The Future is Remembering the Past: Challenges in Archival Storage”, Huazhong University of Science and Technology, Wuhan, China.
- 2014 Jul “Extreme-Scale Storage for High-Performance Computing”, Huazhong University of Science and Technology, Wuhan, China.
- 2014 May “The Future is Remembering the Past: Challenges in Archival Storage”, Huawei, Shenzhen, China.
- 2014 Mar “The Challenges of Building Useful Archival Storage”, Huawei, Santa Clara, CA.
- 2013 Dec “Inside the Pure Storage Flash Array: Building a High Performance, Data Reducing Storage System from Commodity SSDs”, University of Toronto, Toronto, ON, Canada.
- 2013 Nov “Where’d My Photos Go? Challenges in Preserving Digital Data for the Long Term”, online seminar for Millibo, <http://www.millibo.com/>.
- 2013 Nov “Where’d My Photos Go? Challenges in Preserving Digital Data for the Long Term”, University of Houston, Houston, TX.
- 2013 Oct “Inside the Pure Storage Flash Array: Building a High Performance, Data Reducing Storage System from Commodity SSDs”, Carnegie Mellon University, Pittsburgh, PA.
- 2013 Oct “Inside the Pure Storage Flash Array: Building a High Performance, Data Reducing Storage System from Commodity SSDs”, Brown University, Providence, RI.
- 2013 Sep “Screaming Fast Galois Field Arithmetic Using Intel SIMD Instructions”, SNIA Storage Developers Conference, Santa Clara, CA.
- 2013 Sep “Percival: Securely Searching a Secret Split Archive”, 15th International Workshop on High Performance Transaction Systems (HPTS), Asilomar, CA.
- 2013 Jun “The What, Why and How of the Pure Storage Enterprise Flash Array”, Microsoft Research, Mountain View, CA.
- 2013 May “The What, Why and How of the Pure Storage Enterprise Flash Array”, Johannes Gutenberg Universität, Mainz, Germany.
- 2013 Mar “Where’d My Photos Go? Challenges in Preserving Digital Data for the Long Term”, Johannes Gutenberg Universität, Mainz, Germany.
- 2013 Feb “The What, Why and How of the Pure Storage Enterprise Flash Array”, Stony Brook University, Stony Brook, NY.
- 2012 “Providing Secure Long-Term Archival Storage for Digital Data”, Amrita University, Amritapuri, Kerala, India.
- 2012 “Security for High Performance Petascale Storage”, Amrita University, Kochi, Kerala, India.
- 2012 “Object-Based Interfaces for Efficient and Portable Access to S-Class Storage Class Memories”, ITRS ERD Workshop on Emerging Architectures for Storage Class Memory, Monterey, CA.
- 2012 “Safeguarding Information in a Networked World”, University of Florida, Gainesville, FL.
- 2012 “The Architecture of the Pure Storage Flash Storage System”, Microsoft Research, Redmond, WA.
- 2012 Panel member, “Managing Large Archives”, 28th IEEE Conference on Mass Storage Systems and Technologies (MSST 2012), Pacific Grove, CA.
- 2012 “Challenges in Long-Term Data Preservation: How and How Much Money?”, Universidad Católica del Uruguay, Montevideo, Uruguay.
- 2011 “Coding for Long-Term Archival Storage Systems”, Asilomar Signals and Systems Conference, Pacific Grove, California.
- 2011 “Archival Storage for High-End Computing Systems”, 2011 HEC FSIO Workshop, Arlington, VA.
- 2011 “Where’d My Photos Go? Challenges in Preserving Digital Data for the Long Term”, 1st Technion Computer Engineering (TCE) Conference, Technion, Haifa, Israel.
- 2011 Panel member, “Relevant Research in Storage”, 27th IEEE Conference on Mass Storage Systems and Technologies (MSST 2011).
- 2010 “Storage Systems Research at UC Santa Cruz”, EMC / Data Domain.
- 2010 “Building Evolvable, Reliable, Energy-Efficient Secure Archival Storage”, University of Sydney, Sydney, Australia.
- 2010 “Pergamum: Evolvable, Reliable, Energy-Efficient Disk-Based Archival Storage”, XGen Congress: Applying NeXt GENeration Genomic Technologies for Now Generation Discoveries, San Diego, CA.

- 2010 “Fast, Scalable Metadata Search for Large-Scale Storage Systems”, Keio University, Shonan Fujisawa Campus, Tokyo, Japan.
- 2010 “The Role of IT and Education in Preparing Tomorrow’s Leaders” (talk and two panel discussions), Keio University, Shonan Fujisawa Campus, Tokyo, Japan.
- 2010 “Adding Aggressive Error Correction to a High-Performance Flash File System” and “Disk-Based Archiving and Deduplication”, Samsung, San Jose, CA.
- 2009 “Enabling New File System Designs with Non-Volatile Memory”, keynote talk at Symantec’s Cutting Edge event, Mountain View, CA.
- 2009 “Challenges in Building Long-Term Archival Storage from Smart Bricks”, Baskin School of Engineering Research Review Day, Santa Cruz, CA.
- 2009 “Managing Devices and Finding Data in Multi-Petabyte Media Archives”, *The Reel Thing XXII*, Association of Moving Image Archivists, Los Angeles, CA.
- 2009 “Scalable Data Management Using Metadata and Provenance”, 2009 HEC FSIO Workshop, Arlington, VA.
- 2009 “Spyglass: Fast, Scalable Metadata Search for Large-Scale Storage Systems”, National University of Defense Technology, Changsha, China.
- 2009 “Challenges in Preserving Digital Data for the Long Term”, keynote talk, 4th IEEE International Conference on Networking, Architecture, and Storage (NAS 2009), Zhangjiajie, China.
- 2009 “Pergamum: Evolvable Energy Efficient, Reliable, Disk-Based Archival Storage”, University of Twente, Enschede, Netherlands.
- 2009 “Accurately Estimating Reliability of Heterogeneous Storage Systems”, Vrije University, Amsterdam, Netherlands.
- 2009 “The Effectiveness of Deduplication on Virtual Machine Disk Images”, IBM Thomas J. Watson Research Laboratory, Hawthorne, NY.
- 2008 “Pergamum: Energy Efficient, Reliable, Disk-Based Archival Storage”, CITRIS Research Exchange, University of California, Berkeley.
- 2008 “Building Reliable, Efficient Metadata Storage on NVRAM”, Hanyang University, Seoul, Korea.
- 2008 “Building Reliable, Efficient Metadata Storage on NVRAM”, Samsung, Seoul, Korea.
- 2008 “Reliable and Efficient Metadata Storage and Indexing Using NVRAM”, invited talk at the International Workshop on Large-Scale NVRAM Technology (NVRAMOS08) Workshop, Jeju, Korea.
- 2008 “Pergamum: Building Evolvable, Reliable, Searchable, Energy-Efficient Petascale Archival Storage from Disks”, Yahoo!, Santa Clara, CA.
- 2008 “Scaling Metadata and Indexing for Petabyte-Scale Storage”, invited talk at the 5th IEEE International Workshop on Storage Network Architecture and Parallel I/O, Baltimore, MD.
- 2008 Panel member, “SSD in the Enterprise”, Flash Memory Summit, Santa Clara, CA.
- 2008 “Highly Scalable Metadata Search and Indexing”, Metadata Research Panel, 2008 HEC FSIO Workshop, Arlington, VA.
- 2008 “Search and indexing for petabyte-scale storage and beyond”, *Overcoming I/O Bottlenecks in Full Data Path Processing: Intelligent, Scalable Data Management from Data Ingest to Computation Enabling Access and Discovery*, National Science Foundation workshop, Arlington, VA.
- 2008 “Pergamum: Replacing Tape with Energy Efficient, Reliable, Disk-Based Archival Storage”, *The Reel Thing XX*, Association of Moving Image Archivists, Los Angeles, CA.
- 2008 “Pergamum: Evolvable Energy Efficient, Reliable, Disk-Based Archival Storage”, IBM off-site research review, San Jose, CA.
- 2008 “Pergamum: Replacing Tape with Energy Efficient, Reliable, Disk-Based Archival Storage”, LSI Logic, Boulder, CO.
- 2008 “Pergamum: Replacing Tape with Energy Efficient, Reliable, Disk-Based Archival Storage”, 8th Intelligent Storage Workshop, University of Minnesota, Minneapolis, MN.
- 2008 “Pergamum: Replacing Tape with Energy Efficient, Reliable, Disk-Based Archival Storage”, Symantec, Mountain View, CA.
- 2008 “Ceph: A Scalable, High-Performance Distributed File System”, University of Paderborn, Paderborn, Germany.

- 2008 “Pergamum: Replacing Tape with Energy Efficient, Reliable, Disk-Based Archival Storage”, University of Paderborn, Paderborn, Germany.
- 2008 “Scalable Security in Ceph”, Winter 2008 SNIA Security Summit, San Jose, CA.
- 2007 “Recent Research at the Storage Systems Research Center”, Data Domain, Sunnyvale, CA.
- 2007 “POTSHARDS: Secure Long-Term Archival Storage Without Encryption”, University of California, Santa Barbara.
- 2007 “POTSHARDS: Secure Long-Term Archival Storage Without Encryption”, TRUST seminar, University of California, Berkeley.
- 2007 “Disaster Tolerance Codes”, Agami, Sunnyvale, CA.
- 2007 “POTSHARDS: Secure Long-Term Archival Storage Without Encryption”, VMware, Palo Alto, CA.
- 2007 “Reliability Mechanisms for File Systems Using Non-Volatile Memory as a Metadata Store”, Network Appliance, Sunnyvale, CA.
- 2007 “Ceph: A Scalable, High-Performance Distributed File System”, National Technology Alliance Data Retention and Processing Workshop, Herndon, VA.
- 2007 Visited the Data Storage Institute, affiliated with the National University of Singapore. Gave five talks at DSI and discussed DSI-UCSC collaborations with DSI researchers:
- “Ceph: A Scalable, High-Performance Distributed File System”
 - “Maat: Scalable Security for High Performance, Petascale Storage”
 - “POTSHARDS: Secure Long-Term Archival Storage Without Encryption”
 - “Store, Forget, and Check: Using Algebraic Signatures to Check Remotely Administered Storage”
 - “Improving File System Performance and Reliability with Non-Volatile Memory”
- 2007 Panel member, Education Roundtable, Workshop on Experimental Computer Science (EXPCS 2007).
- 2007 Panel member, “High Performance I/O: The Road Less Traveled?” 8th LCI International Conference on High-Performance Clustered Computing.
- 2007 “Using Massive Arrays of Idle Disks (MAIDs) for Long-Term Storage in Digital Libraries”, Digital Library Forum, Pasadena, CA.
- 2007 “POTSHARDS: Secure Long-Term Archival Storage Without Encryption”, University of New Mexico, Albuquerque, NM.
- 2007 “Ceph: Scalable, Reliable, Secure, High-Performance Storage”, Aster Data Systems, Redwood Shores, CA.
- 2007 “Improving File System Performance and Reliability with Non-Volatile Memory”, eBay, San Jose, CA.
- 2007 “POTSHARDS: Secure Long-Term Archival Storage Without Encryption”, Winter 2007 SNIA Storage Security Workshop, San Diego, CA.
- 2007 “Ceph: Scalable, Reliable, Secure, High-Performance Storage”, University of New Mexico, Albuquerque, NM.
- 2007 “POTSHARDS: Secure Long-Term Archival Storage Without Encryption”, IBM Almaden Research Lab, San Jose, CA.
- 2006 **9 talks**, including talks at Brown University, the University of Rhode Island, Sandia National Laboratory, and the National Security Agency.
- 2005 **5 talks**, including a keynote address at a workshop at IBM Haifa (Israel), Stony Brook University, and the University of Maryland Baltimore County.
- 1996–2004 **16 talks**, including talks at Lawrence Livermore National Laboratory, Sandia National Laboratory, and the University of Wisconsin Milwaukee.

UNIVERSITY SERVICE

Academic Senate Service

- 2018–2019 Senate Committee on Information Technology
- 2016–2018 Senate Committee on Academic Personnel
- 2016–2017 CCA Mentor for 3 faculty
- 2015–2016 Committee on Career Advising

- 2012–2014 Committee on Academic Freedom
2007–2008 Committee on Faculty Research Lecture
2006–2007 Committee on Computing and Telecommunications (Fall & Spring)
2004–2006 Chair, Committee on Computing and Telecommunications
2003–2004 Committee on Computing and Telecommunications (Winter & Spring)

Service to the School of Engineering

- 2017 Baskin School of Engineering Reshaping Committee
2001–2011 Computing Infrastructure Committee (**chair**, 2002–2005, 2007–2010)

Service to Crown College

- 2010–2014 Crown College Executive Committee

Service to the Department

NOTE: Service in 2000–2016 is to the Computer Science Department. Service beginning the 2016–17 academic year is to the Computer Engineering Department.

- 2017–2018 Faculty Search Committee
2016–2017 Personnel Committee
2015–2016 Co-chair, Faculty Search Committee (2 positions)
2014–2015 Chair, Faculty Search Committee
2013–2015 Invited Lecturer Committee
2011–2012 Committee on Online Education
2010–2011 Strategic Directions Committee
2004–2016 Personnel Committee
2004–2005 Faculty Search Committee
2003–2004 Faculty Search Committee
2003–2010 Computing Committee
2002–2003 Faculty Search Committee
2001–2002 Faculty Search Committee

Service to the University of California

- 2004–06 Committee on Information Technology and Telecommunications Policy.

Other Service to the Campus

- 2012– UCSC Extension Engineering Advisory Board
2003 Information Technology Vision Committee.

PUBLIC SERVICE

- 2014– Center for Academic Engagement Faculty Fellow, Israel on Campus Coalition.
2011–2014 Area Coordinator, Brown Alumni Interviewing Program
2003–05 Member, Santa Cruz Hillel Board of Directors
2002–2015 Alumni interviewer, Brown University (area chair 2012–2014)

MENTORING AND STUDENT ADVISING

Postdoctoral Scholars

Dates	Relationship	Degree Year	Name and Activities
2010 Fall–2012 Fall	Primary Supervisor		Arifa Nisar
2011 Fall–2013 Summer	Other Advisor		Yasuhiro Ohara (advisor: Darrell Long)

Advisor to Continuing Graduate Students

Daniel Bittman	Ph. D.	2016–
Matthew Bryson	Ph. D.	2016–
James Byron	Ph. D.	2016–
Kenneth Chang	Ph. D.	2016–
Shreyas Kumar	Ph. D.	2012–
Anastasia McTaggart	Ph. D.	2015–
Sinjoni Mukhopadhyay	Ph. D.	2015–
Devashish Purandare	M. S.	2017–

Doctoral Advisor

2015	Rekha Pitchumani	<i>Data Management for Shingled Magnetic Recording Disks</i> (won Computer Science Department Dissertation Award)
2014	Yangwook Kang	<i>High-Performance, Reliable Object-Based NVRAM Devices</i>
2013	Ian Adams	<i>Understanding Long-Term Storage Access Patterns</i>
2013	Avani Wildani	<i>The Promise of Data Grouping in Large Scale Storage Systems</i>
2009	Andrew Leung	<i>Organizing, Indexing, and Searching Large-Scale File Systems</i>
2009	Kevin Greenan	<i>Reliability and Efficiency in Erasure-Coded Storage Systems</i>
2009	Mark Storer	<i>Secure, Energy-Efficient, Evolvable, Long-Term Archival Storage</i>
2005	Qin Xin	<i>Understanding and Coping with Failures in Large-Scale Storage Systems</i>
2004	Ismail Ari	<i>Design and Management of Globally-Distributed Network Caches</i>
2002	Naomi Avigdor	<i>Building a Scalable and Reliable Parallel File System Using Commodity Computers</i>
2000	William Freeman	<i>Decentralized Security for Network-Attached Storage</i>
1998	Timothy Gibson	<i>Long-term UNIX File System Activity and the Efficacy of Automatic File Migration</i>

Doctoral Dissertation Reading Committee Member

2017	Joel Frank	<i>Prof. Darrell Long</i>
2017	Veronica Estrada Galinañes	<i>Prof. Pascal Felber (Université de Neuchâtel, Switzerland)</i>
2017	Yan Li	<i>Prof. Darrell Long</i>
2016	Stephanie Jones	<i>Prof. Darrell Long</i>
2015	Alex Nelson	<i>Prof. Darrell Long</i>
2015	D. J. Capelis	<i>Prof. Darrell Long</i>
2015	Matthias Grawinkel	<i>Prof. André Brinkmann (Johannes Gutenberg University, Mainz)</i>
2014	Aviad Zuck	<i>Prof. Sivan Toledo (Tel Aviv University, Israel)</i>
2014	Raja Appusawamy	<i>Prof. Andy Tanenbaum, (Vrije Universitet, Netherlands)</i>
2013	Aleatha Parker-Wood	<i>Prof. Darrell Long</i>
2013	Dirk Meister	<i>Prof. André Brinkmann (Johannes Gutenberg University, Mainz)</i>
2010	Deepavali Bhagwat	<i>Prof. Darrell Long</i>
2009	Mohammed Khatib	<i>Prof. Pieter Hartel (University of Twente, Netherlands)</i>
2008	David Pease	<i>Profs. Richard Hughey and Darrell Long</i>
2008	Vinay Pai	<i>Prof. Erez Zadok (Stony Brook University)</i>
2008	Guozheng Ge	<i>Prof. E. James Whitehead</i>
2007	Sage Weil	<i>Prof. Scott Brandt</i>
2006	Nikolai Joukov	<i>Prof. Erez Zadok (Stony Brook University)</i>
2006	Lawrence You	<i>Prof. Darrell Long</i>
2006	Feng Wang	<i>Prof. Scott Brandt</i>
2005	Bo Hong	<i>Profs. Darrell Long and Scott Brandt</i>
2005	Scott Banachowski	<i>Prof. Scott Brandt</i>
2002	Ahmed Amer	<i>Prof. Darrell Long</i>
2002	Tsozen (Frank) Yeh	<i>Prof. Darrell Long</i>
2000	Ian Soboroff	<i>Prof. Charles Nicholas (UMBC)</i>

Doctoral Qualifying Exam Committee Member

2017	Xin Li	<i>Prof. Chen Qian</i>
2014	Preeti Gupta	<i>Prof. Ethan Miller</i>
2014	Yan Li*	<i>Prof. Darrell Long</i>
2014	Joel Frank*	<i>Prof. Darrell Long</i>
2014	Alex Nelson*	<i>Prof. Darrell Long</i>
2012	Rekha Pitchumani	<i>Prof. Ethan Miller</i>
2012	Yangwook Kang	<i>Prof. Ethan Miller</i>
2012	Christina Strong*	<i>Prof. Darrell Long</i>
2012	Stephanie Jones*	<i>Prof. Darrell Long</i>
2012	Aleatha Parker-Wood*	<i>Prof. Darrell Long</i>
2012	Ian Adams	<i>Prof. Ethan Miller</i>
2011	Avani Wildani	<i>Prof. Ethan Miller</i>
2011	D. J. Capelis*	<i>Prof. Darrell Long</i>
2010	Lanbo Zhang	<i>Prof. Yi Zhang</i>
2008	Andrew Leung	<i>Prof. Ethan Miller</i>
2008	Dhananjay Sampath	<i>Prof. J. J. Garcia-Luna</i>
2008	Kevin Greenan	<i>Prof. Ethan Miller</i>
2008	Neerja Bhatnagar	<i>Prof. Ethan Miller</i>
2007	Mark W. Storer	<i>Prof. Ethan Miller</i>
2007	Deepavali Bhagwat*	<i>Prof. Darrell Long</i>
2006	Sage Weil*	<i>Prof. Scott Brandt</i>
2006	Elias Sinderson	<i>Prof. E. James Whitehead</i>
2006	Nikolai Joukov	<i>Prof. Erez Zadok (Stony Brook University)</i>
2005	David Pease	<i>Prof. Darrell Long</i>
2004	Guozheng Ge*	<i>Prof. E. James Whitehead</i>
2004	Damian Cieslicki	<i>Prof. Thomas Schwarz (Santa Clara University)</i>
2003	Scott Banachowski	<i>Prof. Scott Brandt</i>
2003	Qin Xin	<i>Prof. Ethan Miller</i>
2003	Bo Hong	<i>Prof. Darrell Long</i>
2003	Feng Wang	<i>Prof. Scott Brandt</i>
2002	Ismail Ari	<i>Prof. Ethan Miller</i>
2001	Tsozen Yeh	<i>Prof. Darrell Long</i>
1999	Naomi Avigdor	<i>Prof. Ethan Miller (UMBC)</i>
1999	William Freeman	<i>Prof. Ethan Miller (UMBC)</i>
1998	Ian Soboroff	<i>Charles Nicholas (UMBC)</i>
1997	Timothy Gibson	<i>Prof. Ethan Miller (UMBC)</i>
1995	Vincent Marier	<i>Prof. Deepinder Sidhu (UMBC)</i>

Note: * indicates that I served as qualifying exam committee chair.

Masters of Science Advisor

2017	Vedang Joshi	non-thesis
2017	Ethan Vadai	non-thesis
2017	Aneesh Neelam	non-thesis
2017	Preeti Gupta	non-thesis
2015	Runchen Liu	non-thesis
2015	Xiaoyuan Lu	<i>Storage Workload Characterization and Performance Prediction for Better I/O Traffic Management</i>
2014	Daniel Rosenthal	non-thesis
2014	Thomas Marlette	non-thesis
2012	Rekha Pitchumani	non-thesis
2011	Nathan Edel	<i>MRAMFS: A Compressing File System for Byte-Addressable Non-Volatile RAM</i>
2010	Keren Jin	<i>Deduplication on Virtual Machine Disk Images</i>
2010	Aleatha Parker-Wood	<i>Security Aware Partitioning for Efficient File System Search</i>
2010	Ian Adams	non-thesis
2009	Mrunal Gawade	non-thesis
2008	Casey Marshall	non-thesis
2008	Danni Fu	non-thesis
2007	Jeff Hagen	<i>Ladon: A Framework for Peer-to-Peer Backup</i>
2007	Max Mehech	non-thesis
2007	Andrew Leung	<i>Security in Scalable Storage Systems</i>
2006	Kevin Greenan	non-thesis
2006	Mark Storer	non-thesis
2005	Christopher Olson	non-thesis
2005	Chengyu Sung	<i>Integrating Pictorial Identity into Secure Email</i>
2005	Sasha Ames	non-thesis
2004	R. J. Honicky	<i>Object Placement Algorithms for OBSD Systems</i>
2001	Kennedy Akala	non-thesis
2000	Vivekand Krishnamoorthi	<i>A Comparison of Long Term File Migration Algorithms</i>
1999	Ting Chen	non-thesis
1998	Junli Liu	non-thesis
1998	Michael Shapiro	non-thesis
1998	Dan Shen	<i>Experiments with Large-Scale N-gram Based Information Retrieval</i>
1998	Changgong Zhang	non-thesis
1997	Eric Robertson	non-thesis
1996	Arun C. Mahendran	non-thesis
1996	Amen Zwa	non-thesis

Masters of Science Reading Committee Member

2016	Borui Wang	<i>Prof. Jishen Zhao</i>
2016	Jun Yuan	<i>Prof. Jishen Zhao</i>
2015	Ignacio Corderi	<i>Prof. Darrell Long</i>
2014	Michael McThrow	<i>Prof. Darrell Long</i>
2014	Erik Steggall	<i>Prof. Darrell Long</i>
2013	Alex Nelson	<i>Prof. Darrell Long</i>
2012	Akhilesh Malivalli	<i>Prof. Darrell Long</i>
2010	Stephanie Jones	<i>Prof. Darrell Long</i>
2008	Rosie Wacha	<i>Prof. Darrell Long</i>
2007	Corrie Scalisi	<i>Prof. Manfred Warmuth</i>
2006	Suma Potluri	<i>Prof. E. James Whitehead</i>
2006	Nikhil Bobb	<i>Prof. Scott Brandt</i>
2005	Travis Odegaard	<i>Prof. Scott Brandt</i>
2004	Svetlana Kagan	<i>Prof. Darrell Long</i>
2004	Deepa Tuteja (thesis)	<i>Prof. Scott Brandt</i>
2003	Suruchi Malapture (thesis)	<i>Prof. Scott Brandt</i>
2003	Karen Glocer	<i>Prof. Darrell Long</i>
2003	Ravindra Vaishampayan	<i>Prof. J. J. Garcia-Luna</i>
2003	Caixue Lin	<i>Prof. Scott Brandt</i>
1999	Amy Germida	<i>Prof. James Plusquellic (UMBC)</i>
1996	Greg Sylvain	<i>Prof. Tim Finin (UMBC)</i>
1996	Chetan Shah	<i>Prof. Charles Nicholas (UMBC)</i>
1996	Scott Stewart	<i>Prof. Tim Finin (UMBC)</i>

Bachelors of Science Thesis Advisor

2017	Varun Arora	<i>Capsule: Clientside Test System to Encompass and Execute ORAM Algorithms for Data Access Pattern Obfuscation</i>
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COURSES TAUGHT

Note that classes from Fall 1994 through Spring 2000 are semester classes, and classes from Fall 2000 onward are quarter classes. Courses in bold italics are those for which I either developed or significantly revised the curriculum.

Undergraduate

Winter 2018	Computer Architecture
Fall 2016	Introduction to Programming in Python
Spring 2016	Operating Systems
Fall 2015	Computer Security
Spring 2015	Operating Systems
Fall 2014	Computer Security
Spring 2014	Introduction to Programming in Python
Winter 2014	Computer Security
Spring 2012	Operating Systems
Spring 2011	Introduction to Programming in Python
Winter 2011	Computer Security
Spring 2010	Computer Security
Spring 2009	Operating Systems
Fall 2008	<i>Introduction to Programming in Python</i>
Spring 2008	Distributed Systems
Fall 2007	Operating Systems
Spring 2007	Computer Security
Spring 2006	Operating Systems
Winter 2006	<i>Distributed Systems</i>
Winter 2005	Computer Security
Fall 2004	Operating Systems
Spring 2004	Computer Security
Fall 2003	Operating Systems
Spring 2003	<i>Computer Security</i>
Winter 2003	Operating Systems
Winter 2002	Introduction to Data Structures
Fall 2001	Operating Systems
Fall 2000	Operating Systems
Fall 1999	Operating Systems
Spring 1999	Operating Systems
Fall 1997	Computer Architecture
Spring 1997	Computer Architecture
Spring 1996	Computer Architecture
Spring 1995	<i>Computer Architecture</i>
Fall 1994	Computer Architecture

Graduate

Fall 2017	<i>Advanced Topics In Computer Engineering: Non-Volatile Memory Systems</i>
Winter 2017	Advanced Operating Systems
Winter 2016	Advanced Operating Systems
Winter 2015	Storage Systems
Fall 2013	Distributed Systems
Fall 2011	<i>Special Topics in Computer Systems: Archival Storage</i>
Winter 2011	Advanced Computer Security
Winter 2010	Distributed Systems
Winter 2009	Advanced Operating Systems
Winter 2008	Storage Systems
Spring 2007	Distributed Systems
Fall 2005	Advanced Operating Systems
Spring 2005	Distributed Systems
Winter 2004	Storage Systems
Fall 2002	Advanced Operating Systems
Spring 2002	<i>Distributed Systems</i>
Spring 2001	Computer Security
Spring 2000	Computer Architecture
Spring 2000	Storage Systems
Fall 1998	Computer Architecture
Spring 1998	Storage Systems
Fall 1997	Computer Architecture
Spring 1997	Operating Systems
Fall 1996	Computer Architecture
Fall 1995	Computer Architecture