

Curriculum Vitae

Zachary N. J. Peterson

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Current Positions

Senior Security Analyst and Director of the Technology Research and Intellectual Property Services (TRIPS) division at Independent Security Evaluators, Baltimore, MD.

Assistant Research Scientist of Computer Science, The Johns Hopkins University, Baltimore, MD.

Education

- PhD 2006 The Johns Hopkins University, Computer Science
Dissertation: Toward Regulatory Compliant Storage Systems
Research: Systems designed to comply with federal electronic record management legislation. Developing technologies include time-shifting versioning, secure deletion, and authenticated audit trails.
Advisor: Professor Randal Burns
- MS 2005 The Johns Hopkins University Information Security Institute, Security Informatics
Project: Secure Deletion in a Versioning File System
Research: Electronic record and content management policy, digital rights, intellectual property, and privacy issues.
Advisors: Professor Gerry Masson and Professor Aviel Rubin
- MS 2002 University of California, Santa Cruz, Computer Science
Thesis: Data Placement for Copy-on-Write Using Virtual Contiguity
Research: Data placement and allocation policies, MEMS-based storage.
Advisor: Professor Darrell D. E. Long
- BS 2000 University of California, Santa Cruz, Computer Engineering
Liberal arts emphasis in music.

Employment History

- 2008– **The Johns Hopkins University**, *Assistant Research Scientist*, Computer Science, Baltimore, MD.
- 2008 **McDaniel College**, *Adjunct Lecturer*, Mathematics and Computer Science, Westminster, MD.
- 2006– **Independent Security Evaluators**, *Senior Security Analyst*, Baltimore, MD.
- 2005 **Independent Security Evaluators**, *Consultant*, Baltimore, MD.
- 2002–06 **The Johns Hopkins University**, *Graduate Researcher*, Hopkins Storage Systems Lab, Baltimore, MD.
- 2000–02 **University of California, Santa Cruz**, *Graduate Researcher*, Computer Systems Lab, Santa Cruz, CA.
- 2000–02 **International Business Machines**, *Research Associate*, Almaden Research Center, San Jose, CA.
- 1999–00 **eBay Inc.**, *Software Engineering Intern*, Santa Cruz, CA.
- 1999–00 **Education Opportunity Program**, *Tutor*, University of California Santa Cruz, Santa Cruz, CA.
- 1998–99 **NetMind Technologies**, *Software Engineering Associate*, Santa Cruz, CA.
- 1997–98 **@Home Networks**, *Software Engineering Intern*, Redwood City, CA.

Publications

Journals

1. R. Burns and Z. Peterson. Security Constructs for Regulatory Compliant Storage. *Communications of the ACM*, 53(1):126-130, January 2010.
2. Z. Peterson and R. Burns. Ext3cow: A Time-Shifting File System for Regulatory Compliance. *ACM Transactions on Storage*, 1(2):190–212, May 2005.

Refereed Conferences

1. G. Ateniese, R. Burns, R. Curtmola, J. Herring, L. Kissner, Z. Peterson and D. Song. Provable Data Possession at Untrusted Stores. In: *Proceedings of the Conference on Computer and Communication Security (CCS)*, ACM, 2007. *Acceptance rate: 18% (55/303)*
2. Z.N.J. Peterson, R. Burns, G. Ateniese and S. Bono. The Design and Implementation of Audit Trails for a Versioning File System. In: *Proceedings of the Conference on File and Storage Technologies (FAST)*, USENIX, 2007. *Acceptance rate: 19% (19/98)*
3. Z.N.J. Peterson, R. Burns, J. Herring, A. Stubblefield and A. Rubin. Secure Deletion for a Versioning File System. In: *Proceedings of the Conference on File and Storage Technologies (FAST)*, USENIX, 2005. *Acceptance rate: 25% (20/125)*
4. B. Hong, S.A. Brandt, D.D.E. Long, E.L. Miller, K.A. Glocer and Z.N.J. Peterson. Zone-Based Shortest Positioning Time First Scheduling for MEMS-Based Storage Devices. In: *Proceedings of the International Symposium on Modeling, Analysis, and Simulation in Computer and Telecommunication Systems (MASCOTS)*, IEEE, 2003. *Acceptance rate: 30%*
5. S.A. Banachowski, Z.N.J. Peterson, E.L. Miller and S.A. Brandt. Intra-File Security for a Distributed File System. In: *Proceedings of the NASA Goddard Conference on Mass Storage Systems and Technologies*, IEEE, 2002. *Acceptance rate: 35%*

Refereed Workshops and Short Papers

1. C. Miller and Z.N.J. Peterson. Analysis of Mutation and Generation-Based Fuzzing. Presented at: *DEF CON 15*, 2007.
2. Z.N.J. Peterson and R. Burns. Building Regulatory Compliant Storage Systems. In: *Proceedings of the Conference on Digital Government Research (dg.o)*, ACM, 2006.
3. R. Burns, Z. Peterson, G. Ateniese and S. Bono. Verifiable Audit Trails for a Versioning File System. In: *Proceedings of the CCS Workshop on Storage Security and Survivability (SSS)*, ACM, 2005.
4. Z.N.J. Peterson, R. Burns and A. Stubblefield. Limiting Liability in a Federally Compliant File System. In: *the PORTIA Workshop on Sensitive Data in Medical, Financial, and Content-Distribution Systems, Privacy, Obligations, and Rights in Technologies of Information Assessment (PORTIA)*, 2004.
5. Z.N.J. Peterson and R.C. Burns. Limiting Liability in a Federally Compliant File System. A Work in Progress at: *the Conference on File and Storage Technologies (FAST)*, USENIX, 2004.
6. Z.N.J. Peterson, S.A. Brandt and D.D.E. Long. Data Placement Based on the Seek Time Analysis of a MEMS-based Storage Device. A Work in Progress at: *the Conference on File and Storage Technologies (FAST)*, USENIX, 2002.

Miscellanea

1. M.W. Pagano and Z.N.J. Peterson. Design and Implementation of Views: Isolated Perspectives of a File System for Regulatory Compliance. Technical Report 09-02. The Johns Hopkins University Department of Computer Science, August 2009.
2. Z.N.J. Peterson. Toward Regulatory Compliant Storage Systems. PhD Dissertation. The Johns Hopkins University, Department of Computer Science, October 2006.
3. Z.N.J. Peterson. Secure Deletion in a Versioning File System. Master's project, The Johns Hopkins University, Information Security Institute, February 2005.
4. Z. Peterson and G. Lande. Opinion/Editorial: Youth Movement. *The Baltimore Sun*, 29 February 2004, pg. 5C.
5. Z.N.J. Peterson. Data Placement for Copy-on-Write Using Virtual Contiguity. Master's thesis, University of California, Santa Cruz, September 2002.
6. I. Ari, S. Banachowski and Z.N.J. Peterson. Conference Reports: Conference on File and Storage Technologies (FAST). ;login:, April 2002, 27(2), pp. 70–80.
7. R.C. Burns, R.M. Rees, Z.N.J. Peterson, and D.D.E. Long. Allocation and Data Placement Using Virtual Contiguity. iNIST/SSRC/01-001. 2001.

Research Artifacts

The ext3cow file system. <http://www.ext3cow.com>. Ext3cow builds upon the popular ext3 file system, the default file system for most Linux distributions, to provide continuous file versioning and file system snapshot. Ext3cow's novel time-shifting interface permits a real-time and continuous view of data in the past. Ext3cow was designed to meet the federal auditability and real-time disclosure requirements set forth in legislation such as Sarbanes-Oxley and HIPAA. It has gone on to be a foundation for developing technical solutions to a wide array of regulatory storage challenges such as: secure deletion, authenticated encryption and verifiable audit trails. Our release of ext3cow for the Linux 2.6 kernel was reported on both slashdot.org and digg.com. The software has been downloaded thousands of times and has an active development community. Ext3cow is used as the basis for on-going research projects at the Johns Hopkins University, UC Berkeley, Columbia University, the University of Utah, and UC Santa Cruz. A startup even uses ext3cow as the file system in their object-based storage product.

The Provable Data Possession (PDP) software library. <http://code.google.com/p/provable-data-possession>. Provable Data Possession is a software library that provides cryptographically strong evidence that storage service providers meet their contractual obligations. Users that store their data at an untrusted server can have probabilistic guarantees that the server possesses the original data. The client needs only to store his cryptographic keys and never has to retrieve the file. PDP uses homomorphic verifiable tags that minimize the amount of server computation, network traffic and block accesses while achieving a strong guarantee of data possession. More details on PDP can be found in the paper: Provable Data Possession at Untrusted Stores.

Dual System Attributed-Based Encryption library. In development. Attribute-Based Encryption (ABE) enables individual users to be granted keys that permit them to decrypt a ciphertext if and only if their key matches certain attributes specified in the creation of a ciphertext or key. Attributes may be comprised of identifiers or logical elements. For example, an electronic health record may be encrypted with the attributes: $\text{Doctor} \wedge \text{Johns Hopkins Hospital} \cap \text{Aetna Insurance}$. This software library implements both *ciphertext policy* ABE and *key policy* ABE, known as a *Dual System* ABE primitive. This software is being developed as part of on-going research into meeting the role-based access control (RBAC) requirements for electronic health data.

Teaching

- 2009 The Johns Hopkins University, *Invited Lecturer*, 650.442: Security and Privacy in Computing.
- 2009 The Johns Hopkins University, *Invited Lecturer*, 650.445: Practical Cryptographic Systems.
- 2008 McDaniel College, *Instructor*, CSC-3365: Topics in Secure Systems.
- 2007 The Johns Hopkins University, *Invited Lecturer*, 600.442: Security and Privacy in Computing.
- 2007 The Johns Hopkins University, *Invited Lecturer*, 600.419: Storage Systems.
- 2006 The Johns Hopkins University, *Co-Lecturer*, 600.419: Storage Systems.
- 2005 The Johns Hopkins University, *Invited Lecturer*, 600.105: Freshman Experience.
- 2005 The Johns Hopkins University, *Teaching Assistant*, 600.107: Introduction to Programming in Java.
- 2004 The Johns Hopkins University, *Invited Lecturer*, 600.105: Freshman Experience.
- 2002 The Johns Hopkins University, *Teaching Assistant*, 600.419: Storage Systems.

Pending Patents

- 2007 Method and Apparatus for Limiting Access to Sensitive Data. (with S. Bono, M. Green, A. Stubblefield).

Invited Talks

- 2010 “Security Constructs for Regulatory-Compliant Storage,” Georgetown University, *Host*: Prof. Clay Shields.
- 2010 “Security Constructs for Regulatory-Compliant Storage,” Naval Postgraduate School, *Host*: Prof. Craig Martell.
- 2007 “Toward Regulatory Compliant Storage Systems,” McDaniel College, *Host*: Prof. Italo Simonelli.
- 2006 “Toward Regulatory Compliant Storage Systems,” The Johns Hopkins University Institute for Security Informatics, *Host*: Prof. Gerry Masson.
- 2002 “Virtual Contiguity: Data Placement for a Versioning File System,” IBM Almaden Research Center, *Host*: Bernie Lopez.
- 2001 “Storage Technology for High Performance Computing,” Lawrence Livermore National Laboratory, *Host*: Steve Louis.

Service

- 2004 www.Youth04.org Chapter Leader for The Johns Hopkins University.
- 2004 Co-editor of The Johns Hopkins University Graduate Representative Organization’s *Graduate Student Handbook*.
- 2003 – 04 Graduate student representative to the Computer Science faculty meetings.
- 2003 Contributing writer to the *Grad News* newspaper.
- 2002 – 06 Moderator of USENET newsgroup for operating systems research, `comp.os.research`.

Peer Review and Referee

- 2010 IEEE Security and Privacy
- 2009 USENIX Conference on File and Storage Technologies (FAST)
- 2006 Communications of the ACM
- 2006 IBM Systems Journal
- 2006 Program Committee for the International Workshop on Storage Security and Survivability (StorageSS)
- 2002 USENIX Conference on File and Storage Technologies (FAST)