THOMAS MOYER

MIT Lincoln Laboratory tmoyer@ll.mit.edu
Secure, Resilient Systems and Technology
244 Wood Street
Lexington, MA 02420

EDUCATION

The Pennsylvania State University University Park, PA
PhD, Computer Science and Engineering, December 2011
Advisor: Dr. Patrick D. McDaniel
Dissertation Title: *Building Scalable Document Integrity Systems*

The Pennsylvania State University University Park, PA
MS, Computer Science and Engineering, 2009
Advisor: Dr. Patrick D. McDaniel
Thesis Title: *Scalable Web Content Attestations*

The Pennsylvania State University University Park, PA
B.S., Computer Engineering, 2006

ACADEMIC APPOINTMENTS

Assistant Professor, August 2017-present
University of North Carolina at Charlotte,
Department of Software and Information Systems
Charlotte, NC

Research Assistant, Summer 2008 to Fall 2011
The Pennsylvania State University, University Park, PA
Advisor: Dr. Patrick D. McDaniel
Worked on problems in virtual machine security.
Utilized technologies for virtualization and trusted hardware to develop secure computing applications.
Worked on problems in Web security.

Research Assistant, Fall 2007 to Spring 2008
The Pennsylvania State University, University Park, PA
Advisor: Dr. Patrick D. McDaniel
Mentor: Dr. Subhabrata Sen
Worked on problems in configuration management.
Assisted in developing/testing tool for creating router configurations.

Instructor, Spring 2007
The Pennsylvania State University, University Park, PA
Department of Computer Science Engineering, Pennsylvania State University
Introduction to Algorithmic Processes (CMPSC 101)
Instructed students in program design and creation using the MS Visual Basic programming language.

INDUSTRIAL APPOINTMENTS

Research Scientist, September 2011 to August 2017
Cyber Systems and Technology Group, MIT Lincoln Laboratory, Lexington, MA
Worked on secure system design and prototyping.

Developed prototype for protected, mobile, satellite communications terminal, including addressing information assurance requirements for multiple organizations.
Developed understanding of certification and accreditation processes used to certify information systems.
Participated in blue-team threat assessment for legacy computer systems.
Supported DoD ASD(R&E) Information Systems and Cyber Technologies office as subject matter expert in cyber security.
Developed secure data provenance architectures for large-scale enterprise systems.

Summer Research Intern AT&T, Summer 2007
Internet and Networking Systems Research Center, AT&T Labs Research, Florham Park, NJ
Mentor: Dr. Subhabrata Sen
Worked on problems in configuration management.
Assisted in developing internal tool for creating configurations.

Systems Administrator, March 2004 to Summer 2007
Geodynamics Research Group, The Pennsylvania State University, University Park, PA
Supervised by Dr. Kevin Furlong
Responsible for maintaining and upgrading systems and infrastructure.
Implemented an automated, platform independent, remote backup system.
Assisted with some minimal scientific programming for research.

PROFESSIONAL ACTIVITIES

Organizing Committee
2018: IEEE Symposium on Security and Privacy (Oakland)
2017: IEEE Symposium on Security and Privacy (Oakland), Annual Computer Security Applications Conference (ACSAC)
2016: Annual Computer Security Applications Conference (ACSAC)
2015: Annual Computer Security Applications Conference (ACSAC)

Program Committee
2018: Network and Distributed System Security Symposium (NDSS), USENIX Security (Security), ProvenanceWeek, International Conference on Science of Cyber Security (SciSec)
2017: International Conference on Availability, Reliability and Security (ARES), International Workshop on Theory and Practice of Provenance (TaPP), International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS), Premier International Conference for Military Communications (MILCOM), IEEE Secure Development Conference (SecDev)
2016: Annual Computer Security Applications Conference (ACSAC), International Conference on Availability, Reliability and Security (ARES), MILCOM
2015: Annual Computer Security Applications Conference (ACSAC), International Conference on Availability, Reliability and Security (ARES)
2014: Annual Computer Security Applications Conference (ACSAC), International Conference on Availability, Reliability and Security (ARES)
2013: Annual Computer Security Applications Conference (ACSAC), International Conference on Availability, Reliability and Security (ARES)
2012: Annual Computer Security Applications Conference (ACSAC), International Conference on Availability, Reliability and Security (ARES)

Reviewer (Years removed for brevity)
ACM Cloud Computing Security Workshop (CCSW)
ACM Computer and Communications Security Conference (CCS)
ACM Symposium on Access Control Models and Technologies (SACMAT)
ACM Transactions on Internet Technology (TOIT)
ACM Transactions on Privacy and Security (TOPS)

Annual Computer Security Applications Conference (ACSAC)
IEEE International Conference on Computer Communications (INFOCOM)
IEEE International Symposium on Hardware Oriented Security and Trust (HOST)
IEEE Security and Privacy Magazine(S&P)
IEEE Symposium on Security and Privacy (Oakland)
IEEE Transactions on Big Data (TBD)
IEEE Transactions on Software Engineering (TSE)
International Conference on Information Security and Assurance (ISA)
International Conference on Information Systems Security (ICISS)
Packt Publishing
Springer-Verlag Transactions on Computational Science (TCS)
USENIX Security Symposium (USENIX Security)
USENIX Workshop on Hot Topics in Security (HotSec)
Wiley Software Practiec and Experience (SPE)
Workshop on Virtual Machine Security (VMSec)

PUBLICATIONS

Journal Publications

1. T. Moyer, K. Butler, J. Schiffman, P. McDaniel, and T. Jaeger. "Scalable Web Content Attestation". In: *IEEE Transactions on Computers* 61.5 (May 2012), pp. 686–699. DOI: 10.1109/tc.2011.60. URL: http://dx.doi.org/10.1109/TC.2011.60

2. Joshua Schiffman, Thomas Moyer, Trent Jaeger, and Patrick McDaniel. "Network-based Root of Trust for Installation". In: *IEEE Security & Privacy Magazine* (Jan. 2011)

3. Kevin Butler, Stephen McLaughlin, Thomas Moyer, and Patrick McDaniel. "New Security Architectures Based on Emerging Disk Functionality". In: *IEEE Security & Privacy Magazine* (Sept. 2010)

4. William Enck, Thomas Moyer, Patrick McDaniel, Subhabrata Sen, Panagiotis Sebos, Sylke Spoerel, Albert Greenberg, Yu-Wei Eric Sung, Sanjay Rao, and William Aiello. "Configuration Management at Massive Scale: System Design and Experience". In: *IEEE Journal on Selected Areas in Communications (JSAC)* (Apr. 2009)

Conference Publications

5. Wajih Ul Hassan, Adam Bates, and Thomas Moyer. "Towards Scalable Cluster Auditing through Grammatical Inference over Provenance Graphs". In: *Network and Distributed System Security Symposium, NDSS 2018*. The Internet Society, 2018, *to appear*

6. Thomas Pasquier, Xueyuan Han, Mark Goldstein, Margo Seltzer, Thomas Moyer, David Eyers, and Jean Bacon. "Practical Whole-System Provenance Capture". In: *Proceedings of the 8th ACM Symposium on Cloud Computing*. SOCC '17. Sept. 2017

7. Adam Bates, Kevin Butler, Alin Dobra, Brad Reaves, Patrick Cable, Thomas Moyer, and Nabil Schear. "Transparent Web Service Auditing via Network Provenance Functions". In: *Proceedings of the 26th International Conference on World Wide Web*. WWW '17. acceptance rate=17.0%. Apr. 2017

8. Nabil Schear, Patric T. Cable II, Thomas Moyer, Bryan Richard, and Robert Rudd. "Bootstrapping and Maintaining Trust in the Cloud". In: *Proceedings of the 32nd Annual Computer Security Applications Conference*. ACSAC 2016. acceptance rate=20.7%. Los Angeles, CA, USA: ACM, Dec. 2016, pp. 1–10. ISBN: 978-1-4503-3682-6. DOI: 10.1145/2818000.2818003. URL: http://doi.acm.org/10.1145/2818000.2818003

9. Thomas Moyer, Patric T. Cable, Karishma Chadha, Robert Cunningham, Nabil Schear, Warren Smith, Adam Bates, Kevin Butler, Frank Capobianco, and Trent Jaeger. "Leveraging Data Provenance to Enhance Cyber Resilience". In: *1st IEEE Cybersecurity Development (SecDev)*. Nov. 2016

10. Thomas Moyer and Vijay Gadepally. "High-throughput Ingest of Data Provenance Records into Accumulo". In: *2016 IEEE High Performance Extreme Computing Conference, HPEC*. Sept. 2016

11. Adam Bates, Dave Tian, Kevin R.B. Butler, and Thomas Moyer. "Trustworthy Whole-System Provenance for the Linux Kernel". In: *24th USENIX Security Symposium (USENIX Security 15)*. Washington, D.C.: USENIX Association, Aug. 2015. URL: `https://www.usenix.org/conference/usenixsecurity15/technical-sessions/presentation/bates`

12. Thomas Moyer, Trent Jaeger, and Patrick McDaniel. "Scalable Integrity-Guaranteed AJAX". in: *Proceedings of the 14th Asia-Pacific Web Conference (APWeb)*. Kunming, China, Apr. 2012

13. Boniface Hicks, Sandra Rueda, Dave King, Thomas Moyer, Joshua Schiffman, Yogesh Sreenivasan, Patrick McDaniel, and Trent Jaeger. "An Architecture for Enforcing End-to-End Access Control Over Web Applications". In: *Proceedings of the 2010 Symposium on Access Control Models and Technologies, SACMAT '10*. June 2010

14. Thomas Moyer, Kevin Butler, Joshua Schiffman, Patrick McDaniel, and Trent Jaeger. "Scalable Web Content Attestation". In: *ACSAC '09: Proceedings of the 2009 Annual Computer Security Applications Conference*. acceptance rate=19.0%. Dec. 2009

15. Joshua Schiffman, Thomas Moyer, Christopher Shal, Trent Jaeger, and Patrick McDaniel. "Justifying Integrity Using a Virtual Machine Verifier". In: *Proceedings of the 2009 Annual Computer Security Applications Conference, ACSAC '09*. acceptance rate=19.0%. Dec. 2009

Workshop Publications

16. Adam Bates, Kevin R.B. Butler, and Thomas Moyer. "Take Only What You Need: Leveraging Mandatory Access Control Policy to Reduce Provenance Storage Costs". In: *7th USENIX Workshop on the Theory and Practice of Provenance (TaPP 15)*. Edinburgh, Scotland: USENIX Association, July 2015. URL: `https://www.usenix.org/conference/tapp15/workshop-program/presentation/bates`

17. Joshua Schiffman, Thomas Moyer, Hayawardh Vijayakumar, Trent Jaeger, and Patrick McDaniel. "Seeding Clouds with Trust Anchors". In: *CCSW '10: Proceedings of the 2010 ACM workshop on Cloud computing security*. ACM, Oct. 2010

Technical Reports

18. Adam Bates, Kevin Butler, Alin Dobra, Brad Reaves, Patrick Cable, Thomas Moyer, and Nabil Schear. "Retrofitting Applications with Provenance-Based Security Monitoring". `https://arxiv.org/abs/1609.00266`. Sept. 2016

19. Thomas Moyer and Patrick McDaniel. *Scalable Integrity-Guaranteed AJAX*. tech. rep. NAS-TR-0149-2011. Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA: Network and Security Research Center, Mar. 2011

20. Thomas Moyer. *USENIX Security Symposium Session Summaries*. ;login: The USENIX Magazine. Aug. 2010

21. Thomas Moyer. *USENIX Conference on Web Application Developement Session Summaries*. ;login: The USENIX Magazine. Oct. 2010

22. Joshua Schiffman, Thomas Moyer, Hayawardh Vijayakumar, Trent Jaeger, and Patrick McDaniel. *Seeding Clouds with Trust Anchors*. Tech. rep. NAS-TR-0127-2010. Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA: Network and Security Research Center, Apr. 2010

23. Kevin Butler, Stephen McLaughlin, Thomas Moyer, Joshua Schiffman, Patrick McDaniel, and Trent Jaeger. *Firma: Disk-Based Foundations for Trusted Operating Systems*. Tech. rep. NAS-TR-0114-2009. Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA: Network and Security Research Center, Apr. 2009

24. Joshua Schiffman, Thomas Moyer, Christopher Shal, Trent Jaeger, and Patrick McDaniel. *No Node Is an Island: Shamon Integrity Monitoring Approach*. Tech. rep. NAS-TR-0103-2009. Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA: Network and Security Research Center, Feb. 2009

25. Kevin Butler, Stephen McLaughlin, Thomas Moyer, Trent Jaeger, and Patrick McDaniel. *SwitchBlade: Policy-Driven Disk Segmentation*. Tech. rep. NAS-TR-0098-2008. Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA: Network and Security Research Center, Nov. 2008

26. Thomas Moyer, Kevin Butler, Joshua Schiffman, Patrick McDaniel, and Trent Jaeger. *Scalable Asynchronous Web Content Attestation*. Tech. rep. NAS-TR-0095-2008. Department of Computer Science and Engineering, Pennslyvania State University, University Park, PA, USA: Network and Security Research Center, Sept. 2008

Invited Talks and Presentations

27. "Transparent Web Service Auditing via Network Provenance Functions". Perth, AU, Apr. 2017

28. "Building Resilient Systems with Secure End-to-End Data Provenance". Ithica, NY, Jan. 2017

29. "Building Resilient Systems with Secure End-to-End Data Provenance". Worcester, MA, Jan. 2017

30. "Leveraging Data Provenance to Enhance Cyber Resilience". Boston, MA, Nov. 2016

31. "Building Resilient Systems with Secure End-to-End Data Provenance". Storrs, CT, Oct. 2016

32. "High-throughput Ingest of Data Provenance Records into Accumulo". Waltham, MA, Sept. 2016

33. "Building Resilient Systems with Secure End-to-End Data Provenance". Lexington, MA, June 2016

34. "Scalable Web Content Attestation". Lexington, MA, Jan. 2011

35. "Building Document Integrity Systems". University Park, PA, Aug. 2011

36. "Scalable Web Content Attestation". Honolulu, HI, Dec. 2009

37. "Scalable Web Content Attestation". University Park, PA, May 2009