

# KEVIN RAYMOND BOYCE BUTLER

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## Areas of specialization

Storage and Systems Security; Networking Security.

## Educational Background

**PH.D., Pennsylvania State University**, Department of Computer Science and Engineering, August 2010  
Dissertation Title: *Leveraging Emerging Storage Functionality for New Security Services*  
Advisor: Dr. Patrick McDaniel

**M.S., Columbia University**, Department of Electrical Engineering, May 2003  
Focus of research: Security in voice over IP networks  
Advisor: Dr. Henning Schulzrinne

**B.Sc., Queen's University at Kingston**, Department of Electrical Engineering, May 1999

## Experience

**University of Oregon**, Assistant Professor of Computer and Information Science, Eugene, OR, Sep. 2010  
- present

- Research and teaching with a focus on security of systems and storage. Teaching: *Seminar on Security in Systems, Storage, and Clouds* (Fall 2010), *Computer and Network Security* (Winter 2011), *Operating Systems* (Spring 2011), *Advanced Topics in Systems Security* (Fall 2011).
- Organized first Computer Security Day at the University of Oregon.

**Symantec Research Labs**, Research Intern, Mountain View, CA, Jun. - Aug. 2009

- Examined host-based validation for portable storage devices, and implemented an embedded Linux prototype. Investigated extension of information flow from the OS into storage.
- Winner of the company-wide Symantec Intern Project Showcase competition, technical division.

**Seagate Research**, Research Intern, Pittsburgh, PA, May - Aug. 2008

- Developed security infrastructures for distributed storage in a home user environment, focussing on distributed access control mechanisms.

**AT&T Labs–Research**, Research Intern, Florham Park, NJ, Dec. 2003 - Aug. 2004

- Investigated security threats in BGP and created an overview of threats and currently deployed solutions. Developed cryptographic constructions allowing efficient security solutions and performed simulations based on trace data.

**Flarion Technologies**, Technical Intern, Bedminster, NJ, Summer 2002

- Implemented packet diversion and IP header modification in BSD for mobile IP packet testing.

**Telcordia Technologies (Bellcore)**, Research Scientist, Morristown, NJ, Sep. 2000 - Nov. 2001

- Created a network engineering and operations environment in a hybrid fibre-coax lab. Configured and maintained routing and DOCSIS equipment. Investigated routing alternatives and service assurance methodologies in multiple service provider environments.

**UUNET (Verizon Business)**, Technical Specialist, Toronto, ON, May 1999 - Aug. 2000

- Monitored and troubleshoot intermediate and backbone connections across the Canadian network. Supervised front line support, acting as escalation. Configured IP, frame relay, and WAN protocols on edge and backbone routers. Tracked DoS attacks, spam, network abuse, and web server scripting.

**Royal Bank of Canada**, Summer Intern Toronto, ON, Summer 1997, 1998

- Performed financial and technical analyses to discover financing opportunities in Life Science and Knowledge Based Industries. Ported applications from mainframe environments to Windows.

## Refereed Publications

### Storage Security:

1. Lara Letaw, Joe Pletcher, and **Kevin Butler**. “Host Identification via USB Fingerprinting”. *6th IEEE International Workshop on Systematic Approaches to Digital Forensics Engineering (SADFE 2011)*, Oakland, CA, USA, May 2011.
2. **Kevin Butler**, Stephen McLaughlin, and Patrick McDaniel, “Kells: A Protection Framework for Portable Data”. *26th Annual Computer Security Applications Conference (ACSAC 2010)*, Austin, TX, USA, December 2010.
3. **Kevin Butler**, Stephen McLaughlin, Thomas Moyer, and Patrick McDaniel. “New Security Architectures Based on Emerging Disk Functionality”. *IEEE Security and Privacy*, 8(5):34–41, Sept.-Oct. 2010.
4. **Kevin Butler**, Stephen McLaughlin, and Patrick McDaniel. “Disk-Enabled Authenticated Encryption” (short paper). *IEEE Symposium on Massive Storage Systems and Technologies (MSST)*, May 2010.
5. Patrick McDaniel, **Kevin Butler**, Stephen McLaughlin, Radu Sion, Erez Zadok, and Marianne Winslett. “Towards a Secure and Efficient System for End-to-End Provenance”. *USENIX Workshop on Theory and Practice of Provenance (TaPP)*, February 2010.
6. **Kevin Butler** and Petros Efstathopoulos. “U Can’t Touch This: Block-Level Protection for Portable Storage”. *International Workshop on Software Support for Portable Storage (IWSSPS)*, October 2009. (Also appears as Symantec Technical Report SRL/MV2009-11)
7. **Kevin Butler**, Stephen McLaughlin, and Patrick McDaniel. “Rootkit-Resistant Disks”. *ACM Conference on Computer and Communications Security (CCS)*, October 2008.
8. **Kevin Butler**, Stephen McLaughlin, and Patrick McDaniel. “Non-Volatile Memory and Disks: Avenues for Policy Architectures”. *Computer Security Architectures Workshop (CSAW)*, November 2007.
9. Shiva Chaitanya, **Kevin Butler**, Anand Sivasubramaniam, Patrick McDaniel and Murali Vilayannur. “Design, implementation and evaluation of security in iSCSI-based network storage systems”. *International Workshop on Storage Security and Survivability (StorageSS)*, October 2006.

### Interdomain Routing Security:

10. **Kevin Butler**, Toni Farley, Patrick McDaniel, and Jennifer Rexford. “A Survey of BGP Security Issues and Solutions.” *Proceedings of the IEEE*, 98(1):100–122, January 2010.

11. **Kevin Butler**, William Aiello, and Patrick McDaniel. “Optimizing BGP Security by Exploiting Path Stability”. *ACM Conference on Computer and Communications Security (CCS)*. November 2006.
12. Patrick McDaniel, William Aiello, **Kevin Butler**, and John Ioannidis. “Origin Authentication in Interdomain Routing”. *Computer Networks*, 50(16), pg. 2953-2980, 14 November 2006.
13. **Kevin Butler** and Patrick McDaniel. “Testing Large Scale BGP Security in Replayable Network Environments”. *DETER Community Workshop on Cyber Security Experimentation and Test*. June 2006.
14. Sophie Qiu, **Kevin Butler**, and Patrick McDaniel. “BGPRV: Retrieving and Processing BGP Data with Efficiency and Convenience”. *DETER Community Workshop on Cyber Security Experimentation and Test*. June 2006.

### **Systems and Host Security:**

15. Machigar Ongtang, **Kevin Butler**, and Patrick McDaniel. “Porscha: Policy Oriented Secure Content Handling in Android.” *26th Annual Computer Security Applications Conference (ACSAC 2010)*, Austin, TX, USA, Dec. 2010.
16. William Enck, **Kevin Butler**, Thomas Richardson, Patrick McDaniel, and Adam Smith. “Defending Against Attacks on Main Memory Persistence”. *24th Annual Computer Security Applications Conference (ACSAC 2008)*, Dec. 2008.
17. **Kevin Butler**, William Enck, Harri Hursti, Stephen McLaughlin, Patrick Traynor, and Patrick McDaniel. “Systemic Issues in the Hart InterCivic and Premier Voting Systems: Reflections Following Project EVEREST”. *USENIX/ACCURATE Electronic Voting Workshop (EVT)*. July 2008.
18. Dhananjay Bapat, **Kevin Butler**, and Patrick McDaniel. “Towards Automatic Privilege Separation”. *International Conference on Information Systems Security (ICISS 2007)*. December 2007.
19. Trent Jaeger, **Kevin Butler**, David King, Serge Hallyn, Joy Latten, and Xiolan Zhang. “Leveraging IPsec for Mandatory Per-Packet Access Control”. *IEEE International Conference on Security and Privacy in Communication Networks (SecureComm)*, August 2006.

### **Network Security and Analysis:**

20. Adam Bates, **Kevin Butler**, Micah Sherr, Clay Shields, Patrick Traynor, and Dan Wallach. “Accountable Wiretapping -or- I Know That You Can Hear Me Now”. *19th ISOC Network and Distributed System Security Symposium (NDSS'12)*, San Diego, CA, USA. February 2012. To appear.
21. **Kevin Butler**, Sunam Ryu, Patrick Traynor, and Patrick McDaniel. “Leveraging Identity-based Cryptography for Node ID Assignment in Structured P2P Systems”. *IEEE Transactions on Parallel and Distributed Systems*, 20(12):1803–1815, December 2009. (*Older version appears in 3rd IEEE International Symposium on Security in Networks and Distributed Systems (SSNDS'07)*.)
22. Patrick Traynor, **Kevin Butler**, William Enck, Kevin Borders, and Patrick McDaniel. “malnets: Large-Scale Malicious Networks via Compromised Wireless Access Points”. *Journal of Security and Communication Networks (SCN)*. 2009.
23. Patrick Traynor, **Kevin Butler**, William Enck, and Patrick McDaniel. “Realizing Massive-Scale Conditional Access Systems Through Attribute-Based Cryptosystems”. *Network and Distributed System Security Symposium (NDSS)*. February 2008.
24. Anusha Sriraman, **Kevin Butler**, Patrick McDaniel, and Padma Raghavan. “Analysis of the IPv4 Address Space Delegation Structure”. *IEEE Symposium on Computers and Communications (ISCC)*. July 2007.
25. **Kevin Butler** and Patrick McDaniel. “Understanding Mutable Internet Pathogens, or How I Learned to Stop

Worrying and Love Parasitic Behavior”. *International Conference on Information Systems Security (ICISS)*, December 2005.

### **Web and Email Security:**

26. Thomas Moyer, Kevin Butler, Joshua Schiffman, Patrick McDaniel, and Trent Jaeger. Scalable Web Content Attestation. *IEEE Transactions on Computers*, 2011. *Conference version appears at ACSAC 2009*.
27. **Kevin Butler**, William Enck, Patrick Traynor, Jennifer Plasterr, and Patrick McDaniel. “Privacy Preserving Web-Based Email”. *Algorithms, Architectures and Information Systems Security*, Statistical Science and Interdisciplinary Research. World Scientific Computing, November 2008. (*Older version appears in 2nd International Conference on Information Systems Security (ICISS 2006)*).
28. Lisa Johansen, **Kevin Butler**, Michael Rowell, and Patrick McDaniel. “Email Communities of Interest”. *Conference on Email and Anti-Spam (CEAS)*. August 2007.

### **Technical Reports and Other Publications**

29. Benjamin Mood, Lara Letaw, and **Kevin Butler**. “Memory-Efficient Garbled Circuit Generation for Mobile Devices”. Technical Report CIS-TR-2011-04, Department of Computer and Information Science, University of Oregon, October 2011.
30. Masoud Valafar and **Kevin Butler**. “Secure Provenance for Cloud Storage”. *2011 IEEE Symposium on Security and Privacy, poster session*, Oakland, CA, USA, May 2011.
31. Kurt Mueller and **Kevin Butler**. “FlexP: Flexible Permissions for Android”. *2011 IEEE Symposium on Security and Privacy, poster session*, Oakland, CA, USA, May 2011.
32. **Kevin Butler**, Stephen McLaughlin, and Patrick McDaniel. “Protecting Portable Storage with Host Validation”. *17th ACM Conference on Computer and Communications Security (CCS’10), poster session*, Chicago, IL, USA, October 2010.
33. **Kevin Butler**, Stephen McLaughlin, Thomas Moyer, Joshua Schiffman, Patrick McDaniel, and Trent Jaeger. “Firma: Disk-Based Foundations for Trusted Operating Systems”. Technical Report NAS-TR-0114-2009, Networking and Security Research Center, Pennsylvania State University, May 2009.
34. **Kevin Butler**, Stephen McLaughlin, Thomas Moyer, Patrick McDaniel, and Trent Jaeger. “SwitchBlade: Policy-Driven Disk Segmentation”. Technical Report NAS-TR-0098-2008, Networking and Security Research Center, Pennsylvania State University, November 2008.
35. Patrick McDaniel, **Kevin Butler**, William Enck, Harri Hursti, Stephen McLaughlin, Patrick Traynor, Matt Blaze, Adam Aviv, Pavol Cerny, Sandy Clark, Eric Cronin, Gaurav Shah, Micah Sherr, Giovanni Vigna, Richard Kemmerer, David Balzarotti, Greg Banks, Marco Cova, Viktoria Felmetzger, William Robertson, Fredrik Valeur, Joseph Lorenzo Hall, and Laura Quilter. “EVEREST: Evaluation and Validation of Election-Related Equipment, Standards and Testing”. Public Report, Ohio Secretary of State 2007.
36. **Kevin Butler**, Stephen McLaughlin, Patrick McDaniel, and Youngjae Kim. “Autonomously Secure Disks”. Technical Report NAS-TR-0072-2007, Network and Security Research Center, Pennsylvania State University, May 2007. (*Updated September 2007.*)
37. Lisa Johansen, **Kevin Butler**, William Enck, Patrick Traynor, and Patrick McDaniel. “Grains of SANs: Building Storage Area Networks from Memory Spots”. Technical Report NAS-TR-0060-2007, Network and Security Research Center, Pennsylvania State University, January 2007.
38. Luke St. Clair, Lisa Johansen, **Kevin Butler**, William Enck, Matthew Pirretti, Patrick Traynor, Patrick McDaniel, and Trent Jaeger. “Password Exhaustion: Predicting the End of Password Usefulness”. Technical Report NAS-TR-0030-2006, Network and Security Research Center, Pennsylvania State University, May

2006. (Updated January 2007.)

39. **Kevin Butler**, USENIX Security Symposium Conference Summaries. 19th, 17th, 16th, 15th USENIX Security Symposia. *USENIX ;login Magazine*, December 2009, 2007, 2006, 2005.

## Grants

- **PI**, *NSF CNS 1118046*, “*TC:Small:Protection Mechanisms for Portable Storage*”, National Science Foundation, \$499,430 (09/01/2011-08/31/2014).
- **co-PI**, *DARPA BAA 10-81*, “*PROCEED:Characterizing and Implementing Efficient Primitives for Privacy-Preserving Computation*”, AFRL (DARPA), \$550,000 (\$262,375) (05/01/2011-01/31/2015).

## Honors & Awards

**Alumni Association Dissertation Award**, Pennsylvania State University, 2010.

**Winner, Symantec Intern Project Showcase Competition**, Symantec Corporation, 2009.

**Symantec Graduate Fellowship**, Symantec Research Labs, 2009-2010.

**Graduate Research Assistant Award**, Computer Science and Engineering Department, Pennsylvania State University, 2009.

**Special Award of Meritous Service**, Third International Conference on Information Systems Security, December 2007.

**University Graduate Fellowship**, Pennsylvania State University, 2006.

**C. Norwood Wherry Memorial Graduate Fellowship**, Pennsylvania State University, 2004-2005.

**IUSSTF Travel Award**, Indo-US Science and Technology Forum, October 2007.

**Student Travel Awards**: USENIX Association, 2009, 2007, 2005; ACM Conference on Computer and Communications Security, 2008; IEEE Symposium on Security and Privacy, 2008.

## Leadership and Teaching Experience

**Instructor, Seminar on Security in Systems, Storage, and Clouds**, University of Oregon, Fall 2010

- Graduate computer security seminar.

**Lead Graduate Student**, Systems and Internet Infrastructure Security (SIIS) Laboratory, Pennsylvania State University, Sep. 2007 - Dec. 2008

- Administrative and logistical lead student in the SIIS lab. Ran weekly lab meetings of 13 members, met with students individually for mentoring and development of leadership and research skills. Responsible for most daily operational activities in the lab.

**Instructor, Computer Networking**, Pennsylvania State University, Jun.-Aug. 2006

- Instructor for *EE/CSE 458*, the senior undergraduate course on computer networking.

**Teaching Assistant, Computer & Network Security**, New York University, Fall 2005

- Lectured, graded, and logistic support for the Stern School of Business MBA course B20.3157.

**Teaching Assistant, Computer System Architecture**, Penn State University, Fall 2004

- Held lab hours and graded for CSE 331, the junior-level architecture course.

**Teaching Assistant, Introduction to Computer Science**, Queen’s University, Fall 1998

- Held office hours and graded for CISC 121, the introductory CS course for majors.

**Guest Lecturer**, Department of Computer Science, Pennsylvania State University, 2005-2010

- *Computer Security (CSE 543)*: presented lectures on cryptography, public key infrastructures, and network security.
- *Advanced Topics in System Security (CSE 597A)*: lectured on virtual machine security.
- *Operating Systems (CSE 411)*: presented lectures on storage systems.
- *Advanced Network Security (CSE 545)*: lectured on BGP security.

## **Professional Service**

### **Conference and Workshop Organization:**

- IEEE Symposium on Security and Privacy (**S&P**), Program Committee Member, 2012; Publications Chair, 2012, 2011; Submissions Chair, 2008; Reviewer, 2009, 2008, 2007.
- International ICST Conference on Security and Privacy in Communication Networks (**SECURECOMM**), Program Committee Member, 2011.
- Financial Cryptography and Data Security Conference (**FC**), Program Committee Member, 2011.
- Annual Computer Security Applications Conference (**ACSAC**), Panels Chair, 2011; Program Committee Member, 2011; Publicity Chair, 2010; Reviewer Committee Member, 2010, 2007, 2006, 2005.
- International Conference on Availability, Reliability and Security (**AReS**), Program Committee Member, 2011, 2010, 2009, 2008, 2007.
- IEEE International Symposium on Data, Privacy, and E-Commerce (**ISDPE**), PC Member, 2010.
- ACM **SIGMETRICS** Conference, Shadow Program Committee Member, 2010.
- International Workshop on Security (**IWSEC**), PC Member, 2011, 2010, 2008, 2007.
- International Conference on Internet Monitoring and Protection (**ICIMP**), PC Member, 2010.
- ACM Conference on Computer and Communications Security (**CCS**), Session Chair, 2008; PC Member, *Industry and Government Track*, 2007, 2004; Reviewer, 2010, 2009, 2008, 2006.
- IEEE International Workshop on Software Security Process (**IWSSP**), PC Member, 2009.
- International Workshop on Security in Systems and Networks (**SSN**), PC Member, 2009, 2007.
- International Conference on Information Systems Security (**ICISS**), Submissions and Website Chair, 2007; Program Committee Member, 2009, 2008, 2007.
- International Conference on Information Security and Assurance (**ISA**), PC Member, 2009, 2008.
- ACM Workshop on Storage Security and Survivability (**StorageSS**), Session Chair, 2008; Reviewer, 2006.
- Conference on Future Generation Communication and Networking (**FGCN**), PC Member, 2008, 2007.
- IEEE International Workshop on Security in Software Engineering (**IWSSE**), PC Member, 2008, 2007.
- IEEE/IFIP Conference on Dependable Systems and Networks (**DSN**), PC Member, *Fast Abstracts Track*, 2008.
- International Workshop on Secure Software Engineering (**SecSE**), PC Member, 2008.

## **Reviewing Activities:**

**Reviewer (Journal and Book)**, ACM Transactions on Storage, 2011; IEEE Transactions on Information Forensics and Security (TIFS), 2011; International Journal of Computer Mathematics, 2011; IEEE Transactions on Parallel and Distributed Systems (TPDS), 2011, 2008; Computers and Security, 2011; IEEE Security and Privacy, 2010; Wiley and Sons (Book proposal reviewer), 2010; IEEE Transactions on Dependable and Secure Computing (TDSC), 2010; ACM Transactions on Internet Technologies (TOIT), 2010, 2009; EURASIP Journal on Information Security (JIS), 2011, 2010; ACM Transactions on Information and System Security (TISSEC), 2010, 2009, 2008, 2006; Elsevier Journal of Computer Networks, 2010, 2005; International Journal of Software and Informatics (IJSI), 2010; IEEE Transactions on Computers (TC), 2009; International Journal of Security and Networks (IJSN), 2009, 2007; The Computer Journal (Oxford), 2009; ACM/IEEE Transactions on Networking (TON), 2008; Wireless Personal Communications, 2008; IEEE Communications Surveys and Tutorials, 2007; IEEE Transactions on Software Engineering (TSE), 2007; Software: Practice and Experience, 2007; Handbook of Information Security, 2004.

**Reviewer (Conference and Workshop)**, ISOC Symposium on Network and Distributed Systems Security (NDSS), 2012, 2009, 2007; IEEE Computer Security Foundations Symposium (CSF), 2011; USENIX Workshop on Hot Topics in Security (HotSec), 2010, 2007; ACM Symposium on Access Control Models and Technologies (SACMAT), 2010, 2009, 2008, 2006; IFCA International Conference on Financial Cryptography and Data Security (FC), 2010, 2008, 2007; Information Security Conference (ISC), 2009; USENIX Security Symposium, 2009, 2008, 2007, 2006, 2004; IEEE GLOBECOM, 2008; IFIP Conference on Data and Applications Security (DBSEC), 2008, 2006; USENIX Conference on File and Storage Technologies (FAST), 2008; IEEE International Conference on Computer Engineering and Systems (ICCES), 2007; IEEE International Conference on Distributed Computing Systems (ICDCS), 2007; IEEE Sarnoff Symposium, 2007; IEEE/IFIP International Conference on Dependable Systems and Networks (DSN), 2007; IEEE INFOCOM, 2007; International Workshop on Security (IWSEC), 2006; International Conference on Emerging Trends in Computer Science (ETRICS), 2006; International Conference on Applied Cryptography and Network Security (ACNS), 2006; European Symposium on Research in Computer Security (ESORICS), 2005.

## **Academic Research Experience**

### **Pennsylvania State University, Research Assistant, 2004-2010**

- Senior Personnel on NSF HECURA Collaborative Research grant: Secure Provenance in High-End Computing Systems, NSF (CCF), \$307,073, Aug. 2009 - present.
- Investigated security and performance of storage systems, focussing on disks capable of autonomously enforcing security policy. Funded by NSF HECURA 0621429 (2006-2010).
- Examined solutions for BGP security and how to simulate them at Internet-scale. Funded by NSF CNS-0335241, 2005-2006.

### **Columbia University, Graduate Research Assistant, 2001-2002**

- Investigated SIP security, implemented authentication mechanisms into Panasonic JAIN SIP stack.
- Designed XML-based repository for BGP routing updates to develop a secure routing validator.

## **Presentations & Invited Talks**

### **Leveraging Emerging Storage Functionality for New Security Services**

Naval Postgraduate School (Monterey, CA, February 2010), University of Oregon (Eugene, OR, February 2010), University of Tennessee (Knoxville, TN, March 2010), Stevens Institute of Technology (Hoboken, NJ, March 2010), Simon Fraser University (Surrey, BC, March 2010), Polytechnic Institute of NYU (Brooklyn, NY, March 2010), Galois (Portland, OR, August 2011).

### **Securing Homecare Rehabilitation Environments**

UW/MSR Research Retreat, Cle Elum, WA, August 2011.

### **Challenges and Alternatives to the Host Identification Problem**

2nd ACM Northeast Forensics Exchange (NeFX2010), Washington, DC, September 2010.

### **Towards a Secure and Efficient System for End-to-End Provenance**

TaPP'10 (San Jose, CA, February 2010), HEC FSIO Workshop (Arlington, VA, August 2010).

### **Disk-Enabled Authenticated Encryption**

MSST 2010 (Incline Village, NV, May 2010).

### **Protections for Portable Storage**

IWSSPS 2009 (Grenoble, France, October 2009), Symantec (Mountain View, CA, August 2009).

### **Rootkit-Resistant Disks**

CCS'08 (Alexandria, VA, October 2008), Carleton University (Ottawa, ON, November 2009),  
University of Toronto (November 2009).

### **Non-Volatile Memory and Disks: Avenues for Policy Architectures**

USENIX Security Symposium, *Works in Progress* (Boston, MA, August 2007),  
University of Michigan (September 2007), CSAW 2007 (Alexandria, VA, November 2007).

### **Experimenting with BGP Security Mechanisms Using the DETER Framework**

Boeing Integrated Defense (Philadelphia, PA, October 2008).

### **Terabyte Home Security and Access Control**

Seagate Research (Pittsburgh, PA, August 2008).

### **Towards Automated Privilege Separation**

ICISS 2007 (Delhi, India, December 2007).

### **Analysis of the IPv4 Address Delegation Structure**

ISCC 2007 (Aveiro, Portugal, July 2007.)

### **Performance Optimizations of IPsec for Storage.**

2007 SNIA Summer Security Summit (Pittsburgh, PA, June 2007).

### **Optimizing BGP Security by Exploiting Path Stability**

CCS'06 (Alexandria, VA, November 2006).

### **Threats and Attacks in Interdomain Routing**

P2INGS Quarterly Meeting (Tempe, AZ, February 2004).

### **Network Operations in Tier-1 Internet Service Providers**

Columbia University (March 2001), Telcordia Technologies (Morristown, NJ, August 2000).