

Joshua Reich

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Citizenship: US

Interests

Networking, operating systems, distributed systems, programming languages: applied to problems in cloud computing; enterprise, datacenter, and provider networks; storage and big data; mobile and wireless systems; interactions with end-users; design of economical and environmental technology.

Education

COLUMBIA UNIVERSITY

New York, NY

July, 2011 Ph.D in Computer Science
Advisors: Vishal Misra and Dan Rubenstein

May, 2004 M.S. in Computer Science

May, 2002 B.A. in Mathematics
magna cum laude

Positions

2011– **Research Scholar** Princeton University, *Princeton, NJ*
Conduct research on Software Defined Networks. Lead development of Pyretic programming platform and SDN hardware testbed. Mentor and advise students (undergrad, MS, PhD).

2011–2012 **Co-Founder** Infinio (formerly Silver Lining Systems), *New York, NY*
Advised on product architecture and commercialization of middleware technology. Conducted technology research, assessment, and integration. Produced demos. Drafted patents. Setup infrastructure. Met with funders and potential clients. Assessed candidate employees.

2006–2011 **Graduate Research Assistant** Columbia University, *New York, NY*
Conducted research on cloud computing, mobile networking, green computing. Supervised graduate students.

2009 **Intern** Microsoft Research, *Redmond, WA*
Designed and implemented sleep-proxying system to save power in the enterprise. Deployed proxies on 50+ user workstations in six subnets, conducted extensive measurements, and built tools for administration and report generation.

2008–2009 **Intern** Technicolor (formerly Thomson) Research, *Boulougne, France*
Worked on content dissemination in opportunistic environments. Developed analytic model for assessing optimal content dissemination mechanisms. Built simulator and verified performance using published real-world contact traces.

2008 **Intern** Microsoft Research, *Bangalore, India*
Worked on RFID privacy in mobile P2P networks. Designed protocol for object detection w/ minimal information leakage. Implemented prototype system on Windows Mobile handsets.

- 2012 **Assisted w/** Coursera, Software Defined Networking.
Designed Pyretic module. Provided materials for lecture. Monitored course discussion board.
- 2005–2007 **Instructor**, Columbia University, COMS W3101-2: Programming Languages C++.
Designed course from scratch: including interactive programming tutorials, lecture notes, programming assignments, and exams. Lectured, held office hours, managed TAs, and administered grades. Course was offered both live (2 semesters) and online (5 semesters).
- 2006 **Head Teaching Assistant**, Columbia University, COMS W4203: Graph Theory.
Lectured. Graded written homework and examinations. Held office hours, led review sessions. Designed and administered website and electronic resources. Managed TAs.
- 2005 **Head Teaching Assistant**, Columbia University, COMS W4205: Combinatorial Theory.
Graded written homework and examinations. Held office hours, led review sessions. Designed and administered website and electronic resources.
- 2001 **Teaching Assistant**, Columbia University, COMS S1007: Introduction to Computer Science.
Graded several thousands of lines of student code. Held office hours, led review sessions.

Advising

- current Hyojoon Kim (PhD, Georgia Tech), Srinivas Narayan (PhD, Princeton), Naga Katta (PhD, Princeton), Omid Alipourfard (MS, ASU)
- 2013 Xin Jin (PhD, Princeton), Mario Alvarez (BA, Princeton)
- 2012 Nanxi Kang (PhD, Princeton), Wenley Tong (BA, Princeton)
- 2011 Michael Lin (MS, Columbia), Yi Lin (BS, Columbia), Chun Li (BS, Columbia)
- 2010 Abhijit Kulkarni (MS, Columbia), Amit Ranpise (MS, Columbia), Chinmay Gaikwad (MS, Columbia), Alexandre Ling Lee (MS, Columbia)
- 2009 Preeti Malik (MS, Columbia)
- 2008 Matt Yu-Ming Chang (MS, Columbia)

Patents

VMTorrent: A Technique for Quick and Scalable Virtual Machine Distribution and Execution (Inventors: J. Reich, E. Brosh, O. Laadan, A. Sherman, V. Misra, J. Nieh, D. Rubenstein), provisional patent filed November, 2010.

Device and method for controlling dissemination of data by transfer of sets of instructions between peers having wireless communication capacities (Inventors: A. Chaintreau, J. Reich), filed May 2009, granted March 2012.

Device and method for controlling dissemination of contents between peers having wireless communication capacities, depending on impatience reaction functions (Inventors: A. Chaintreau, J. Reich), filed May 2009, granted March 2012.

OpenSource Software

Pyretic SDN Programming Platform, <http://www.frenetic-lang.org/pyretic/>

Refereed Conference Publications

- [1] Christopher Monsanto, Joshua Reich, Nate Foster, Jennifer Rexford, and David Walker. Composing Software-Defined Networks. In *USENIX NSDI*, pages 1–13, April 2013.
Community award paper.

- [2] Joshua Reich, Oren Laadan, Eli Brosh, Alex Sherman, Vishal Misra, Jason Nieh, and Dan Rubenstein. VMTorrent: Scalable P2P Virtual Machine Streaming. In *ACM CoNEXT*, pages 289–300, December 2012.
- [3] Joshua Reich, Vishal Misra, Dan Rubenstein, and Gil Zussman. Connectivity Maintenance in Mobile Wireless Networks via Constrained Mobility. In *IEEE Infocom*, pages 927–935, April 2011.
- [4] Joshua Reich, Aman Kansal, Michel Gorackzo, and Jitendra Padhye. Sleepless in Seattle No Longer. In *USENIX ATC*, June 2010.
- [5] Joshua Reich and Augustin Chaintreau. The Age of Impatience: Optimal Replication Schemes for Opportunistic Networks. In *ACM CoNEXT*, pages 85–96, December 2009.

Refereed Workshop Publications

- [6] Laurent Vanbever, Joshua Reich, Theophilus Benson, Nate Foster, and Jennifer Rexford. HotSwap: Correct and Efficient Controller Upgrades for Software-Defined Networks. In *ACM SIGCOMM HotSDN*, pages 133–138, August 2013.
- [7] Salman A. Baset, Joshua Reich, Jan Janak, Pavel Kasperek, Vishal Misra, Dan Rubenstein, and Henning Schulzrinne. How Green is IP-Telephony? In *SIGCOMM Green Networking Workshop*, pages 77–83, August 2010.
- [8] Joshua Reich, Vishal Misra, and Dan Rubenstein. The Time Correlated Update Problem. In *MAMA*, San Diego, CA, June 2007. ACM.
- [9] Joshua Reich and Betsy Sklar. Toward Automatic Reconfiguration of Robot-Sensor Networks for Urban Search and Rescue. In *First International Workshop on Agent Technology for Disaster Management (ATDM): Fifth International Joint Conference on Autonomous Agents and Multiagent Systems*, pages 18–23, Hakodate, Japan, May 2006. ACM.
- [10] Joshua Reich and Betsy Sklar. Robot-Sensor Networks for Search and Rescue. In *IEEE International Workshop on Safety, Security and Rescue Robotics*, Gaithersburg, MD, August 2006.

Refereed Journal Publications

- [11] Joshua Reich, Dan Rubenstein, Vishal Misra, and Gil Zussman. Connectivity Maintenance in Mobile Wireless Networks via Constrained Mobility. *JSAC Special Issue: Communications Challenges and Dynamics for Unmanned Autonomous Vehicles*, 30(5):935–950, June 2012.
- [12] Joshua Reich, Vishal Misra, and Dan Rubenstein. Roomba MADNeT: a Mobile Ad-hoc Delay Tolerant Network Testbed. *MC2R: Mobile Computing and Communications Review*, 12(1):68–70, January 2008.
- [13] Joshua Reich, Vishal Misra, and Dan Rubenstein. The Time Correlated Update Problem. *Performance Evaluation Review*, 35(2):33–35, September 2007.

Refereed Demos and Posters

- [14] Nanxi Kang, Joshua Reich, Jennifer Rexford, and David Walker. Policy Transformation in Software Defined Networks. In *ACM SIGCOMM*, Helsinki, Finland, August 2012.
Student Research Competition: Graduate 3rd Place.
- [15] Joshua Reich, Oren Laadan, Eli Brosh, Alex Sherman, Vishal Misra, Jason Nieh, and Dan Rubenstein. VMTorrent: Virtual Appliances On-Demand. In *ACM SIGCOMM*, New Delhi, India, August 2010.
Student Research Competition: Graduate Finalist.
- [16] Joshua Reich, Vishal Misra, and Dan Rubenstein. MADNeT Testbed. In *Joint Mobicom / Mobihoc Student Demo Competition*, Montreal, QC, September 2007. ACM.
Best Student Demo.

Unrefereed Publications

- [17] Hyojoon Kim, Arpit Gupta, Muhammad Shahbaz, Joshua Reich, Nick Feamster, and Russ Clark. Simpler Network Configuration with State-Based Network Policies. Technical Report SCS Technical Report ; GT-CS-13-04, Georgia Institute of Technology, 2013.
- [18] Joshua Reich, Christopher Monsanto, Nate Foster, Jennifer Rexford, and David Walker. Modular SDN Programming with Pyretic. *USENIX ;login*, 38(5):40–47, October 2013.
- [19] Nate Foster, Arjun Guha, Mark Reitblatt, Alec Story, Michael J. Freedman, Naga Praveen Katta, Christopher Monsanto, Joshua Reich, Jennifer Rexford, Cole Schlesinger, David Walker, and Rob Harrison. Languages for Software-Defined Networks. *IEEE Communications Magazine*, 51(2):128–134, February 2013.
- [20] Joshua Reich and Augustin Chaintreau. Replication Schemes for Opportunistic Networks with Impatient Users. In *Forty-Seventh Annual Allerton Conference on Communication, Control, and Computing*, October 2009.
- [21] Joshua Reich and Augustin Chaintreau. The Age of Impatience: Optimal Replication Schemes for Opportunistic Networks. Technical Report CR-PRL-2009-06-0001, Thomson S.A., Paris Networking Lab, June 2009.
- [22] Joshua Reich, Vishal Misra, Dan Rubenstein, and Gil Zussman. Spreadable Connected Autonomic Networks (SCAN). Technical Report CUCS-016-08, Columbia University, March 2008.

Refereed Conference Talks

- [23] Composing Software-Defined Networks. *USENIX NSDI*, April 2013. Lombard, IL.
- [24] VMTorrent: Scalable P2P Virtual Machine Streaming. *ACM CoNEXT*, December 2012. Nice, France.
- [25] Connectivity Maintenance in Mobile Wireless Networks via Constrained Mobility. *IEEE Infocom*, April 2011. Shanghai, China.
- [26] Sleepless in Seattle No Longer. *USENIX ATC*, June 2010. Boston, MA.
- [27] The Age of Impatience: Optimal Replication Schemes for Opportunistic Networks. *ACM CoNEXT*, December 2009. Rome, Italy.

Refereed Workshop Talks

- [28] How Green is IP-Telephony? *SIGCOMM Green Networking Workshop*, August 2010. New Delhi, India.
- [29] The Time Correlated Update Problem. *MAMA*, June 2007. San Diego, CA.
- [30] Robot-Sensor Networks for Search and Rescue. *IEEE International Workshop on Safety, Security and Rescue Robotics*, August 2006. Gaithersburg, MD.

Invited Talks

- [31] Modular Programming for Software Defined Networks.
ON.LAB, Palo Alto, CA (23 Aug 13); *Bay Area Network Virtualization Group*, Mountain View, CA (21 Aug 13); *Facebook*, Menlo Park, CA (20 Aug 13); *Sodero*, Cranbury, NJ (24 Jul 13); *IBM*, Yorktown Heights, NY (11 Mar 13); *UCSD*, San Diego, CA (6 Mar 13); *UCLA*, Los Angeles, CA (30 Nov 12); *USC*, Los Angeles, CA (29 Nov 12); *University of Michigan*, Ann Arbor, MI (12 Nov 12); *MURI*, Princeton, NJ (26 Oct 12).
- [32] P2P File-Systems for Scalable Content Use. *GBR*, October 2011. Buzios, Brazil.
- [33] Sleepless in Seattle No Longer. *NEM, Green Networking Track*, October 2010. Barcelona, Spain.

- [34] Roomba MADNeT: A Mobile Ad-hoc Delay-tolerant Networking Testbed. *NSF Wireless Internet Center for Advanced Technology*, October 2007. University of Virginia, Charlottesville, VA.
- [35] Robot-Sensor Networks for Search and Rescue. *NSF Wireless Internet Center for Advanced Technology*, April 2006. University of Virginia, Charlottesville, VA.

References

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