

Niraj Tolia

<http://www.tolia.org/>
ntolia@gmail.com, niraj.tolia@hp.com

EDUCATION

Carnegie Mellon University, Pittsburgh, PA

Ph.D. in Electrical and Computer Engineering October 2007
Advisor: M. Satyanarayanan

M.S. in Electrical and Computer Engineering May 2003
• GPA: 4.0/4.0

B.S. in Electrical and Computer Engineering with a double major in Computer Science May 2002
• Graduated with University Honors and Carnegie Institute of Technology College Honors
• GPA: 4.0/4.0

PROFESSIONAL EXPERIENCE

HP Labs, Palo Alto, CA

October 2007 - Present

Senior Researcher, Exascale Computing Lab

- Investigating unified power and cooling management to improve energy efficiency in data centers.
- Conducting research on next-generation “data-centric” data centers and Infrastructure-as-a-Service (IaaS) systems. This includes work on non-volatile storage technologies, “big data” and NoSQL frameworks and applications, and the Open Cirrus cloud computing testbed.

Carnegie Mellon University, Pittsburgh, PA

August 2002 - October 2007

Research Assistant

- Conducted research on various aspects of distributed systems, focusing on optimizing network transfers over Wide-Area Networks.
- Designed and implemented DOT, an architecture for Internet data transfer services.
- Designed and implemented the CASPER file system that used CAS to optimize client performance and the Lookaside Caching system that integrated portable and distributed storage.
- Designed and implemented the Ganesh and Cedar middleware systems that optimized wide-area and mobile access to database systems.
- Co-led and designed the Snowbird Virtual Machine migration project for optimizing the performance of resource- and interaction-intensive applications.

Intel Research Labs, Cambridge, United Kingdom

June 2004 - August 2004

Summer Intern

- Worked on the Xen Virtual Machine (VM) project.
- Investigated the performance impact of isolating device drivers within their own VM.
- Designed a test framework using the iSCSI protocol and used it to evaluate system performance.

Intel Research Labs, Pittsburgh, PA

June 2003 - August 2003

Summer Intern

- Worked on Internet Suspend/Resume, a Virtual Machine migration project.
- Investigated the use of Content Addressable Storage (CAS) for improved client caching.
- Used distributed file system traces to analyze performance improvements from using CAS.

Intel Research Labs, Pittsburgh, PA

June 2002 - August 2002

Summer Intern

- Worked on Internet Suspend/Resume, a Virtual Machine migration project.
- Designed and implemented CASPER, a CAS-based file system, to optimize VM migration.

- Designed and implemented a network processor simulator for 3G routers that provided a complete development environment in the absence of hardware.

REFEREED PAPERS

Gunho Lee, **Niraj Tolia**, Parthasarathy Ranganathan, and Randy H. Katz. “Topology-Aware Resource Allocation for Data-Intensive Workloads.” To appear in the *Proceedings of the 1st ACM Asia-Pacific Workshop on Systems (ApSys2010)*, New Delhi, India, August, 2010.

Zhikui Wang, **Niraj Tolia**, and Cullen Bash. “Opportunities and Challenges to Unify Workload, Power, and Cooling Management in Data Centers.” *Proceedings of the 5th International Workshop on Feedback Control Implementation and Design in Computing Systems and Networks (FeBID 2010)*, Paris, France, April 2010.

Luca Parolini, **Niraj Tolia**, Bruno Sinopoli, Bruce H. Krogh. “A Cyber-Physical Systems Approach to Energy Management in Data Centers.” *Proceedings of the 1st ACM/IEEE International Conference on Cyber-Physical Systems (ICCPs 2010)*, Stockholm, Sweden, April 2010.

Niraj Tolia, Zhikui Wang, Parthasarathy Ranganathan, Cullen Bash, Manish Marwah, and Xiaoyun Zhu. “Unified Thermal and Power Management in Server Enclosures.” *Proceedings of the ASME/Pacific Rim Technical Conference and Exhibition (InterPACK '09)*, San Francisco, CA, July 2009.

Zhikui Wang, Cullen Bash, **Niraj Tolia**, Manish Marwah, Xiaoyun Zhu, and Parthasarathy Ranganathan. “Optimal Fan Speed Control for Thermal Management of Servers.” *Proceedings of the ASME/Pacific Rim Technical Conference and Exhibition (InterPACK '09)*, San Francisco, CA, July 2009.

Vishakha Gupta, Ada Gavrilovska, Karsten Schwan, Harshvardhan Kharche, **Niraj Tolia**, Vanish Talwar, Parthasarathy Ranganathan. “GViM: GPU-accelerated Virtual Machines.” *Proceedings of the 3rd Workshop on System-level Virtualization for High Performance Computing (HPCVirt 2009)*, Nuremberg, Germany, March 2009.

Niraj Tolia, Zhikui Wang, Manish Marwah, Cullen Bash, Parthasarathy Ranganathan, and Xiaoyun Zhu. “Delivering Energy Proportionality with Non Energy-Proportional Systems – Optimizing the Ensemble.” *Proceedings of the Workshop on Power Aware Computing and Systems (HotPower '08)*, San Diego, CA, December 2008.

H. Andrés Lagar-Cavilla, **Niraj Tolia**, Eyal de Lara, M. Satyanarayanan, and David O'Hallaron. “Interactive Resource-Intensive Applications Made Easy.” *Proceedings of the ACM/IFIP/USENIX 8th International Middleware Conference (Middleware 2007)*, Newport Beach, CA, November 2007.

Niraj Tolia, M. Satyanarayanan, and Adam Wolbach. “Improving Mobile Database Access Over Wide-Area Networks Without Degrading Consistency.” *Proceedings of the 5th International Conference on Mobile Systems, Applications, and Services (MobiSys 2007)*, San Juan, Puerto Rico, June 2007.

H. Andrés Lagar-Cavilla, **Niraj Tolia**, M. Satyanarayanan, and Eyal de Lara. “VMM-Independent Graphics Acceleration.” *Proceedings of the 3rd International ACM Conference on Virtual Execution Environments (VEE '07)*, San Diego, CA, June 2007.

Niraj Tolia and M. Satyanarayanan. “Consistency-preserving Caching of Dynamic Database Content.” *Proceedings of the 16th International World Wide Web Conference (WWW2007)*, Banff, Canada, May 2007.

Partho Nath, Michael Kozuch, David O'Hallaron, Jan Harkes, M. Satyanarayanan, **Niraj Tolia**, and Matt Toups. "Design Tradeoffs in Applying Content Addressable Storage to Enterprise-scale Systems Based on Virtual Machines." *Proceedings of the 2006 USENIX Annual Technical Conference (USENIX '06)*, Boston, MA, May-June 2006.

Niraj Tolia, Michael Kaminsky, David G. Andersen, and Swapnil Patil. "An Architecture for Internet Data Transfer." *Proceedings of the 3rd Symposium on Networked Systems Design and Implementation (NSDI '06)*, San Jose, CA, May 2006.

Niraj Tolia, Jan Harkes, Michael Kozuch, and M. Satyanarayanan. "Integrating Portable and Distributed Storage." *Proceedings of the 3rd USENIX Conference on File and Storage Technologies (FAST '04)*, San Francisco, CA, March 2004.

Niraj Tolia, Michael Kozuch, M. Satyanarayanan, Brad Karp, Thomas Bressoud, and Adrian Perrig. "Opportunistic Use of Content Addressable Storage for Distributed File Systems." *Proceedings of the 2003 USENIX Annual Technical Conference (USENIX '03)*, San Antonio, TX, June 2003.

Jason Flinn, Shafeeq Sinnamohideen, **Niraj Tolia**, and M. Satyanarayanan. "Data Staging on Untrusted Surrogates." *Proceedings of the 2nd USENIX Conference on File and Storage Technologies (FAST '03)*, San Francisco, CA, March 2003.

OTHER REFEREED AND INVITED PUBLICATIONS

M. Satyanarayanan, Benjamin Gilbert, Matt Toups, **Niraj Tolia**, Ajay Surie, David R. O'Hallaron, Adam Wolbach, Jan Harkes, Adrian Perrig, David J. Farber, Michael A. Kozuch, Casey J. Helfrich, Partho Nath, and H. Andrés-Lagar Cavilla. "Pervasive Personal Computing in an Internet Suspend/Resume System." *IEEE Internet Computing*, Vol. 11, No. 2, March, 2007.

Niraj Tolia, David G. Andersen, and M. Satyanarayanan. "Quantifying Interactive User Experience on Thin Clients." *IEEE Computer*, Vol. 39, No. 3, March 2006.

Niraj Tolia, David G. Andersen, Michael Kaminsky, and Swapnil V. Patil. "What the Protocol Stack Missed: The Transfer Service." Work-In-Progress Abstract, *20th ACM Symposium on Operating Systems Principles*, Brighton, United Kingdom, October 2005.

EXTERNAL FUNDING

NSF GOALI: "Models, Metrics, and Control Strategies for Energy Efficient Data Centers." Funding: \$490,000. PI: Bruno Sinopoli. Co-PIs: **Niraj Tolia**, Bruce Krogh.

PATENTS AND INVENTION DISCLOSURES

Six patents and an additional fourteen disclosures filed on data-intensive applications, Infrastructure-as-a-Service (IaaS) systems, virtualization, non-volatile memory-based systems, and power and cooling.

SELECTED INVITED TALKS

"Infrastructure Management in an Ensemble OS" (Short Talk). *Open Cirrus Workshop*, Palo Alto, CA, June 8, 2009.

"Zephyr: A Model-based Approach to Unified Thermal and Power Management." *University of California Santa Barbara Computer Science Colloquia*, Santa Barbara, CA, June 1, 2009.

"Benchmarks for Mobile Data Access." *MobiEval 2007: Workshop on System Evaluation for Mobile Platforms*, San Juan, Puerto Rico, June 11, 2007.

TEACHING AND MENTORSHIP

Mentor, MentorNet January 2008 - Present
Volunteer mentor for increasing graduate student diversity in engineering and science.

Teaching Assistant, Carnegie Mellon University, Pittsburgh, PA
15-821: Mobile and Pervasive Computing Fall 2006
18-842: Distributed Systems Spring 2003

Project Mentor, Carnegie Mellon University, Pittsburgh, PA
18-845: Internet Services Spring 2006
15-821: Mobile and Pervasive Computing Fall 2005

PROFESSIONAL ACTIVITIES

Program Committee:

- USENIX Workshop on Sustainable Information Technology (SustainIT '10)
- USENIX Conference on File and Storage Technologies (FAST '09)

Steering Committee:

- USENIX Workshop on Sustainable Information Technology (SustainIT '10)

Reviewing Panels:

- Multiple NSF Panels (2009)
- GENI Development and Prototyping Panel (2008)

Reviewer for:

- IEEE Transactions on Computers (2009)
- The European Conference on Computer Systems 2009 (EuroSys '09)
- International Symposium on High-Performance Computer Architecture (HPCA 2009)
- International Conf. on Measurement and Modeling of Computer Systems (SIGMETRICS 2008)
- USENIX Conference on File and Storage Technologies (FAST '08)
- Conference on Ubiquitous Computing (UbiComp 2007)
- Workshop on Real, Large, Distributed Systems (WORLDS 2006)
- Conference on Ubiquitous Computing (UbiComp 2006)
- Symposium on Networked Systems Design and Implementation (NSDI '06)
- USENIX Conference on File and Storage Technologies (FAST '05)
- Symposium on Operating Systems Design and Implementation (OSDI '04)
- Mobile Computing and Communications Review (MC²R - ACM SIGMOBILE)

Professional Affiliations:

- Carnegie Mellon University Alumni Officer (Bay Area) 2008 - Present
- Advanced Computing Systems Association (USENIX) 2003 - Present
- Association for Computing Machinery (ACM) 2004 - Present
 - ACM Special Interest Group on Operating Systems (SIGOPS)
- MentorNet 2008 - Present
- Storage Networking Industry Association (SNIA) 2004 - 2007
- Parallel Data Lab, Carnegie Mellon University (PDL) 2003 - 2007

CITIZENSHIP

US Permanent Resident (“Green Card”), Indian Citizen