

Niraj Tolia

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EDUCATION

Carnegie Mellon University, Pittsburgh, PA

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

Expected: October 2007

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

Carnegie Mellon University, Pittsburgh, PA

Research Assistant

August 2002 - Present

- 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

Summer Intern

June 2004 - August 2004

- 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

Summer Intern

June 2003 - August 2003

- 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

Summer Intern

June 2002 - August 2002

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

Cisco Systems, Research Triangle Park, NC

Software Development Engineer (Co-op Program)

January 2001 - July 2001

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

RESEARCH EXPERIENCE

Content Addressable Storage

August 2002 - Present

My research has demonstrated that the performance of WAN-based client-server architectures can be improved significantly through the use of Content Addressable Storage (CAS). I have shown that this can be done without invasive architectural changes and while preserving the semantics of the original system. In particular, we have applied CAS to a span of distributed systems including file and storage systems, databases, and generic bulk data transfer services.

Virtualization and Virtual Machines

May 2005 - Present

I am also a co-lead on *Snowbird*, a project targeted towards *bimodal* applications that alternate between resource-intensive and interactive phases. Snowbird uses VM migration to allow such applications to switch between thick and thin client modes of execution in a completely automated and transparent manner. Without imposing any language or OS restrictions, Snowbird can significantly improve the performance of bimodal applications.

REFEREED CONFERENCE PAPERS

H. Andrés Lagar-Cavilla, **Niraj Tolia**, Eyal de Lara, M. Satyanarayanan, and David O'Hallaron. "Interactive Resource-Intensive Applications Made Easy." To appear in the *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)*, Puerto Rico, June 2007.

H. Andrés Lagar-Cavilla, **Niraj Tolia**, M. Satyanarayanan, and Eyal de Lara. "VMM-Independent Graphics Acceleration." *Proceedings of the Third 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 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.

INVITED TALKS

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

CONFERENCE PRESENTATIONS

"Improving Mobile Database Access Over Wide-Area Networks Without Degrading Consistency." *5th International Conference on Mobile Systems, Applications, and Services (MobiSys 2007)*, Puerto Rico, June 12th, 2007.

"Consistency-preserving Caching of Dynamic Database Content." *16th International World Wide Web Conference (WWW2007)*, Banff, Canada, May 10th, 2007.

"An Architecture for Internet Data Transfer." *3rd Symposium on Networked Systems Design and Implementation (NSDI '06)*, San Jose, CA, May 9th, 2006.

"What the Protocol Stack Missed: The Transfer Service." Work-In-Progress Session, *20th ACM Symposium on Operating Systems Principles (SOSP '05)*, Brighton, UK, October 25th, 2005.

"Integrating Portable and Distributed Storage." *3rd USENIX Conference on File and Storage Technologies (FAST '04)*, San Francisco, CA, April 2nd, 2004.

"Opportunistic Use of Content Addressable Storage for Distributed File Systems." *2003 USENIX Annual Technical Conference (USENIX '03)*, San Antonio, TX, June 13th, 2003.

OTHER PRESENTATIONS

"Integrating Portable and Distributed Storage"

- Distributed Systems Group Talk, Microsoft Research Cambridge, UK, August 12th, 2004.
- Network and Operating Systems Seminar, University of Cambridge, UK, July 15th, 2004.
- Systems Design and Implementation Seminar, Carnegie Mellon University, PA, March 18th, 2004.

"Opportunistic Use of Content Addressable Storage by Distributed File Systems"

- Hewlett-Packard StorageWorks Technical Council, July 27nd, 2005.
- Systems Design and Implementation Seminar, Carnegie Mellon University, PA, May 22nd, 2003.

TEACHING AND MENTORSHIP

Teaching Assistant, Carnegie Mellon University, Pittsburgh, PA

15-821: Mobile and Pervasive Computing

18-842: Distributed Systems

Fall 2006

Spring 2003

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

Spring 2006
Fall 2005

HONORS

Research Fellowship, Department of Electrical and Computer Engineering	2002 - Present
Outstanding Undergraduate, Honorable Mention, Computing Research Association	2002
Patterson Prize, Department of Electrical and Computer Engineering	2001
Team Achievement Award, Cisco Achievement Program	2001
Conference Scholarships (FAST '03, USENIX '03, OSDI '04, SOSP '05, NSDI '06, WWW '07, MobiSys '07)	

PROFESSIONAL ACTIVITIES

Reviewer for:

- 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:

- Advanced Computing Systems Association (USENIX)
- Association for Computing Machinery (ACM)
 - ACM Special Interest Group on Operating Systems (SIGOPS)
- Storage Networking Industry Association (SNIA)
 - Technical Working Group: IO Traces, Tools and Analysis (2004-2005)
- Parallel Data Lab, Carnegie Mellon University (PDL)