

KIRAN-KUMAR MUNISWAMY-REDDY

CONTACT INFORMATION

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INTERESTS

File systems, distributed systems, and cloud computing.

EDUCATION

- 2004 - 2010 PhD, **Harvard University**, Cambridge, MA
Computer Science
Thesis Title: *Foundations for Provenance-Aware Systems*
Advisor: *Prof. Margo Seltzer*
- 2004 - 2007 M.S., **Harvard University**, Cambridge, MA
Computer Science
- 2002 - 2003 M.S., **Stony Brook University**, Stony Brook, NY
Computer Science
Thesis Title: *Versionfs: A Versatile and User-Oriented Versioning File System*
Advisor: *Prof. Erez Zadok*
- 1996 - 2000 B.E., **Bangalore University**, Bangalore, India
Computer Science and Engineering
College: *P.E.S. Institute of Technology*

WORK EXPERIENCE

- 2010 – present Software Development Engineer, Amazon.com, Seattle, WA
- Part of the distributed key-object mapping team in Simple Storage Service (S3).
 - Involved in enhancing the automatic partition management component.
- 2004 – 2010 Research Assistant, Harvard University, Cambridge, MA
- Involved in the design, implementation, and maintenance of Provenance-Aware Storage System (PASS), a file system that transparently tracks and maintains system level lineage of data. Designed and developed the local PASS file system, and extended PASS to network attached storage (NFS) and cloud storage (Amazon Web Services).
 - Explored issues in integrating application level provenance (web browsers, Python applications, and workflow engines) with the system provenance collected by PASS.
 - Developed a versioning file system and algorithms that take advantage of provenance at run-time to make intelligent versioning decisions.
 - Evaluated the performance of various database architectures (Embedded databases, RDBMS, and XML) under provenance generation workloads.
 - Explored issues in leveraging mobile ad-hoc network (MANET) protocols in wireless sensor networks.
- Summer 2007 Research Intern, Microsoft, Redmond, WA
- Worked on evaluating the effectiveness of various system-level mechanisms on avoiding PC *freezes*. Developed a tool that freezes the PC on demand in order evaluate machine learning techniques for detecting freezes.
 - Collaborators: *Dr. John Dunagan and Dr. Sumit Basu*

- Summer 2006 Research Intern, HP Labs, Palo Alto, CA
- Designed and prototyped a file system that manages multiple heterogeneous storage tiers while providing a single unified interface to the tiers.
 - Collaborators: *Dr. Kim Keeton, Dr. Marcos Aguilera, Dr. Arif Merchant and Dr. Mustafa Uysal*
- Summer 2005 Research Intern, IBM Watson Research Center, Hawthorne, NY
- Designed and prototyped a model for discovering application-data relationships between applications hosted on application containers such as IBM websphere.
 - Collaborators: *Dr. Kostas Magoutis and Dr. Murthy Devarakonda*
- 2002 – 2003 Research Assistant, Stony Brook University, Stony Brook, NY
- Designed and developed Versionfs, a file system designed to provide flexible version control policies to users.
 - Worked on Equota, a stackable disk quota management file system that reduces storage management costs through intelligent space reclamation policies.
 - Developed the FreeBSD 4.x templates for FiST, a language and system for stackable file system code generation.
- 2000 – 2001 Software Engineer, IBM Global Services India Pvt. Ltd., Bangalore, India
- Maintenance and Build Administration for Netfinity Manager, OS/2 testing

TEACHING EXPERIENCE

- Spring 2008 Teaching Fellow for *Information Management*, Harvard University
- Fall 2006 Teaching Fellow for *Information Management*, Harvard University
- Spring 2006 Teaching Assistant for *Database and Information Management Systems*, Harvard Extension School
- Spring 2000 Teaching Assistant for *Undergraduate Java & Data Structures*, P.E.S. Institute of Technology, Bangalore, India

PUBLICATIONS

Refereed Conference Papers

Kiran-Kumar Muniswamy-Reddy, Peter Macko, and Margo Seltzer. Provenance for the Cloud. In *Proceedings of the 8th USENIX Conference on File and Storage Technologies*, Feb 2010.

Kiran-Kumar Muniswamy-Reddy, Uri Braun, David A. Holland, Peter Macko, Diana Maclean, Daniel Margo, Margo Seltzer, and Robin Smogor. Layering in provenance systems. In *Proceedings of the 2009 USENIX Annual Technical Conference (USENIX 2009)*, June 2009.

Kiran-Kumar Muniswamy-Reddy and David A. Holland. Causality-Based Versioning. In *Proceedings of the 7th USENIX Conference on File and Storage Technologies (FAST 2009)*, Feb 2009. Selected as a top paper and forwarded to Dec. 2009 issue of Transactions on Storage (TOS).

Marcos Kawazoe Aguilera, Kimberly Keeton, Arif Merchant, Kiran-Kumar Muniswamy-Reddy, and Mustafa Uysal. Improving recoverability in multi-tier storage systems. In *Proceedings of 37th Annual IEEE/IFIP International Conference on Dependable Systems and Networks (DSN 2007)*, June 2007.

Kiran-Kumar Muniswamy-Reddy, David A. Holland, Uri Braun, and Margo Seltzer. Provenance-aware storage systems. In *Proceedings of the 2006 USENIX Annual Technical Conference (USENIX 2006)*, June 2006.

Kiran-Kumar Muniswamy-Reddy, Charles P. Wright, Andrew Himmer, and Erez Zadok. A Versatile and User-Oriented Versioning File System. In *Proceedings of the Third USENIX Conference on File and Storage Technologies (FAST 2004)*, San Francisco, CA, March/April 2004.

Refereed Journal Papers

Kiran-Kumar Muniswamy-Reddy and David A. Holland. Causality-Based Versioning. *ACM Transactions on Storage (TOS)*, 5(4):1–28, Dec 2009.

David A. Holland, Margo I. Seltzer, Uri Braun, and Kiran-Kumar Muniswamy-Reddy. Passing the provenance challenge. *Concurrency and Computation: Practice & Experience (CCPE)*, 20(5):531–540, 2008.

Refereed Workshop and Other Papers

Kiran-Kumar Muniswamy-Reddy and Margo Seltzer. Provenance as first class cloud data. *SIGOPS Oper. Syst. Rev.*, 43(4):11–16, 2010.

Kiran-Kumar Muniswamy-Reddy and Margo Seltzer. Provenance as first-class cloud data. In *3rd ACM SIGOPS International Workshop on Large Scale Distributed Systems and Middleware (LADIS'09)*, 2009.

Kiran-Kumar Muniswamy-Reddy, Peter Macko, and Margo Seltzer. Making a cloud provenance-aware. In *1st Workshop on the Theory and Practice of Provenance (TaPP 2009)*, 2009.

David A. Holland, Uri Braun, Diana Maclean, Kiran-Kumar Muniswamy-Reddy, and Margo I. Seltzer. Choosing a Data Model and Query Language for Provenance. In *Proceedings of the 2008 International Provenance and Annotation Workshop (IPAW 2008)*, June 2008.

Kostas Magoutis, Murthy Devarakonda, and Kiran-Kumar Muniswamy-Reddy. Galapagos: Automatically discovering application-data relationships in networked systems. In *10th IFIP/IEEE International Symposium on Integrated Network Management (IM 2007)*, May 2007.

Uri Braun, Simson Garfinkel, Kiran-Kumar Muniswamy-Reddy, David A. Holland, and Margo Seltzer. Issues in automatic provenance collection. In *Proceedings of the 2006 International Provenance and Annotation Workshop (IPAW 2006)*, May 2006.

Bor rong Chen, Kiran-Kumar Muniswamy-Reddy, and Matt Welsh. Ad-hoc multicast routing on resource-limited sensor nodes. In *The Second ACM/Sigmobile workshop on Multi-hop Ad Hoc Networks: from theory to reality (REALMAN 2006)*, May 2006.

Jonathan Ledlie, Chaki Ng, David A. Holland, Kiran-Kumar Muniswamy-Reddy, Uri Braun, and Margo Seltzer. Provenance-aware sensor data storage. In *1st IEEE International Workshop on Networking Meets Databases (NetDB 2005)*, April 2005.

E. Zadok, J. Osborn, A. Shater, C. P. Wright, K. Muniswamy-Reddy, and J. Nieh. Reducing Storage Management Costs via Informed User-Based Policies. In *Proceedings of the 12th NASA Goddard, 21st IEEE Conference on Mass Storage Systems and Technologies (MSST 2004)*, pages 101–105, April 2004.

Tech Reports

Bor rong Chen, Kiran-Kumar Muniswamy-Reddy, and Matt Welsh. Lessons learned from implementing ad-hoc multicast routing in sensor networks. Technical Report TR-22-05, Computer Science, Harvard University, 2005. <ftp://ftp.deas.harvard.edu/techreports/tr-22-05.pdf>.

E. Zadok, J. Osborn, A. Shater, C. P. Wright, K. Muniswamy-Reddy, and J. Nieh. Reducing Storage Management Costs via Informed User-Based Policies. Technical Report FSL-02-02, Computer Science Department, Stony Brook University, September 2002. www.fsl.cs.sunysb.edu/docs/quotas-policy/policy.pdf.

PATENTS

Modifying a system in response to indications of user frustration

Sumit Basu, John Dunagan, Kevin Duh, and Kiran-Kumar Muniswamy-Reddy

Filed for patent

Recoverability of a dataset associated with a multi-tier storage system

Mustafa Uysal, Arif Merchant, Kim Keeton, Marcos Aguilera, and Kiran-Kumar Muniswamy-Reddy

Filed for patent

Stackable file systems and methods thereof

Erez Zadok, Charles P. Wright, Akshat Aranya, Abhijith Damodara Das, Yevgeniy Y. Miretskiy, Kiran-Kumar Muniswamy-Reddy, and Andrew P. Himmer

Filed for patent

TALKS

Invited Talks

Provenance for the Cloud, SRI International, Feb 2010.

Foundations for Provenance-Aware Systems, IBM Watson, Nov 2009.

Foundations for Provenance-Aware Systems, NEC labs, Nov 2009.

Foundations for Provenance-Aware Systems, Aster Data, Oct 2009.

Availability in the Cloud, HPTS 2009, Oct 2009.

Refereed Conference and Workshop Talks

Provenance for the Cloud, FAST 2010, Feb 2010.

Provenance as First-Class Cloud Data, LADIS 2009, Oct 2009.

Layering in Provenance Systems, USENIX 2009, June 2009.

Causality-Based Versioning, FAST 2009, Feb 2009.

Making the Cloud Provenance-Aware, TaPP 2009, Feb 2009.

Provenance-Aware Storage Systems, USENIX 2006, June 2006.

Provenance-Aware Storage Systems, FAST 2005 WIP, Dec 2005.

Versionfs: A Versatile and User-Oriented Versioning File System, FAST 2004, April 2004.

Reducing Storage Management Costs via Informed User-Based Policies, MSST 2004, April 2004.

Intern Talks

Policy Driven Data Management in a Multi-Storage Tier File System, HP Labs, Aug 2006.

Galapagos: Relating Applications and Data for End-to-End Information Lifecycle Management, IBM Watson, Aug 2005.

Workshop Talks

Provenance Challenge, 2nd Provenance Challenge Workshop, July 2007.

Issues in PASSv2, 3rd PASS Workshop, Jan 2007.

Provenance Storage, 2nd PASS Workshop, May 2006.

ACADEMIC SERVICE

Program Committee Member First International Workshop on Data Management and Analytics for Semi-Structured Business Processes (dma4sp 2011), in conjunction with International Conference on Data Engineering (ICDE) 2011

Referee USENIX FAST 2010

Referee Sixteenth International Conference on Parallel Computing (Euro-Par) 2010

Referee ACM TISSEC

Referee StorageSS 2006

Referee USENIX FAST 2005

Faculty Search Student Committee Member, Harvard Computer Science, Spring 2008

Program Committee Meeting Scribe USENIX FAST 2009

Session Summarizer LADIS 2009, HotCloud 2009, USENIX 2009, TaPP 2009, USENIX 2008, SOSP 2007, USENIX 2006, and FAST 2004.

POSTER SESSIONS AND WORK-IN-PROGRESS REPORTS

David A. Holland, Uri Braun, Diana Maclean, Kiran-Kumar Muniswamy-Reddy, and Margo Seltzer. Choosing a Data Model and Query Language for Provenance. Poster presented at the *Second International Provenance and Annotation Workshop (IPAW'08)*, Salt Lake City, UT.

Margo Seltzer, David A. Holland, Kiran-Kumar Muniswamy-Reddy, Uri Braun, and Jonathan Ledlie. Provenance-Aware Storage Systems. Poster presented at *Fourth USENIX Conference on File and Storage Technologies (FAST '05)*, San Francisco, CA.

Margo Seltzer, Kiran-Kumar Muniswamy-Reddy, David A. Holland, Uri Braun, and Jonathan Ledlie. Provenance-Aware Storage Systems. Poster presented at *Harvard Industrial Partnership (HIP) 2005*, Cambridge, MA

Charles P. Wright, Abhijith Das, Jay Dave, Puja Gupta, Nikolai Joukov, Aditya Kashyap, Hari Krishnan, Devaki Kulkarni, Yevgeniy Miretskiy, Kiran-Kumar Muniswamy-Reddy, Gopalan Sivathanu, Abhishek Rai, Mohammad Zubair, and Erez Zadok. A Stackable Smorgasbord. Poster presented at the *Third USENIX Conference on File and Storage Technologies (FAST '04)*, San Francisco, CA.

Erez Zadok, Jeffrey Osborn, Charles P. Wright and Kiran-Kumar Muniswamy-Reddy. Elastic Quotas: Stretch Your Disk Space. Presented at the *Graduate Research Conference*, Computer Science Department, SUNY Stony Brook.

Erez Zadok, Jeffrey Osborn, Charles P. Wright, and Kiran-Kumar Muniswamy-Reddy. Elastic Quotas. WIP presented at the *Fifth Symposium on Operating Systems Design and Implementation (OSDI '02)*, Boston, MA.

AWARDS AND SCHOLARSHIPS

Student Stipend Recipient HotCloud 2009, USENIX 2009, USENIX 2008, USENIX 2006

Student Stipend Recipient FAST 2010, FAST 2009, FAST 2008, FAST 2005, FAST 2004

Student Stipend Recipient SOSP 2009, SOSP 2007

Student Stipend Recipient NSDI 2007