USENIX

FAST '08

6th USENIX Conference on File and Storage Technologies

FEBRUARY 26–29, 2008 | SAN JOSE, CALIFORNIA

Sponsored by USENIX in cooperation with ACM SIGOPS, IEEE Mass Storage Systems Technical Committee (MSSTC), and IEEE TCOS

The 6th USENIX Conference on File and Storage Technologies (FAST '08) brings together storage systems researchers and practitioners to explore new directions in the design, implementation, evaluation, and deployment of storage systems.

Back again for '08, the FAST program is offering tutorials. Taking place on Tuesday, February 26, the four half-day tutorials give you the opportunity to learn from leaders in the storage industry. Take advantage of the special FAST offer: Buy one half-day tutorial and get the second one for free.

This year's innovative technical program includes 21 technical papers, as well as 2 keynote addresses, Work-in-Progress Reports (WiPs), and a poster session. See the full program on the reverse side of this page.

Don't miss this opportunity to meet with premier storage systems researchers and practitioners for three and one-half days of ground-breaking file and storage information and training. Register by Friday, February 8, 2008, at www.usenix.org/fast2008 and save up to $200!

Make your hotel reservation early!
The Fairmont San Jose Phone: (800) 346-5550 http://www.fairmont.com/sanjose/
Mention the USENIX FAST Conference or use Promotional Code GRUSE1 to get our special rate.

Join us for the premier end-user storage event.

Co-located with the 2008 Linux Storage & Filesystem Workshop, taking place February 25–26, 2008
See www.usenix.org/lsf08 for more information.

Tutorial Program

Tuesday, February 26, 2008

Half Day Tutorials (a.m.)

T1 Clustered and Parallel Storage System Technologies

Brent Welch and Marc Unangst, *Panasas*

This tutorial will examine current state-of-the-art high-performance file systems and the underlying technologies employed to deliver scalable performance across a range of scientific and industrial applications.

T2 Storage Class Memory, Technology, and Use

Richard Freitas, Winfried Wilcke, and Bülent Kurdi, *IBM Almaden Research Center*

The advent of Storage Class Memory (SCM) technology will likely have a significant impact on the design of future storage systems. This tutorial will describe several of the SCM technologies and how the availability of an SCM technology will impact the design of storage controllers, storage systems, etc.

Half Day Tutorials (p.m.)

T3 Parallel I/O for High-Performance Computing

Rob Ross and Rob Latham, *Argonne National Laboratory*

Today's scientific applications demand that high-performance I/O be part of their operating environment. This tutorial will examine the I/O software stack, from parallel file systems (PFSs), through intermediate layers such as MPI-IO, to high-level I/O libraries such as HDF-5. We will also discuss I/O best practice.

T4 Cryptographic Methods for Protecting Storage Systems

Christian Cachin, *IBM Zurich Research Laboratory*

This tutorial presents cryptographic methods for storage protection, with a focus on recently developed techniques for encryption, integrity protection, and access control.

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Erik Riedel, *Seagate Research*

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Tutorial Chair
Richard Golding, *IBM Almaden Research Center*

Work-in-Progress Reports and Posters Chair
Geoff Kuenning, *Harvey Mudd College*

Wednesday, February 27

8:30 a.m.–10:00 a.m. Wednesday

OPENING REMARKS AND AWARDS

Program Chairs: Mary Baker, *Hewlett-Packard Labs;* Erik Riedel, *Seagate Research*

KEYNOTE ADDRESS

"It's like a fire. You just have to move on": Rethinking Personal Digital Archiving

Cathy Marshall, *Senior Researcher, Microsoft*

10:30 a.m.–noon Wednesday

DISTRIBUTED STORAGE

Pergamum: Replacing Tape with Energy Efficient, Reliable, Disk-Based Archival Storage

Mark W. Storer, Kevin M. Greenan, and Ethan L. Miller, *University of California, Santa Cruz;* Kaladhar Voruganti, *NetApp*

Scalable Performance of the Panasas Parallel File System

Brent Welch, Garth Gibson, Marc Unangst, Jim Zelenka, Jason Small, Brian Mueller, Bin Zhou, and Zainul Abbasi, *Panasas*

TierStore: A Distributed Filesystem for Challenged Networks in Developing Regions

Michael Demmer, Bowei Du, and Eric Brewer, *University of California, Berkeley*

Noon–1:30 p.m. Conference Luncheon

1:30 p.m.–3:00 p.m. Wednesday

YOU CACHE, I CACHE . . .

On Multi-level Exclusive Caching: Offline Optimality and Why Promotions Are Better Than Demotions

Binny Gill, *IBM Almaden Research Center*

AWOL: Adaptive Write Optimizations in Linux

Alexandros Batsakis and Randal Burns, *Johns Hopkins University;* James Lentini, Arkady Kanevsky, and Thomas Talpey, *NetApp*

TaP: Table-based Prefetching for Storage Caches

Mingju Li, Elizabeth Varki, and Swapnil Bhatia, *University of New Hampshire;* Arif Merchant, *Hewlett-Packard Labs*

3:30 p.m.–5:00 p.m. Wednesday

WORK-IN-PROGRESS REPORTS (WIPS)

Work-in-Progress reports present early results or "outrageous" opinion statements. We are particularly interested in presentations by students. Submit an abstract (one page or less, in plain text or PDF) to fast08wips@usenix.org by midnight PST, January 17, 2008.

5:00 p.m.–7:00 p.m. Wednesday

POSTER SESSION HAPPY HOUR

The poster session will allow researchers to present recent and ongoing projects. Submissions should include a description of the research, two pages or less in plain text or PDF. If a demo will accompany your poster, the proposal should briefly describe its nature. Send proposals to fast08posters@usenix.org by midnight PST, January 17, 2008.

Thursday, February 28

9:00 a.m.–10:00 a.m. Thursday

KEYNOTE ADDRESS

Sustainable IT Ecosystem

Chandrakant Patel, *HP Fellow, Hewlett-Packard Labs*

10:30 a.m.–noon Thursday

FAILURES AND LOSS

The RAID-6 Liberation Codes

James S. Plank, *University of Tennessee*

Is Disk the Dominant Contributor for Storage Subsystem Failures? A Comprehensive Study of Failure Characteristics

Weihang Jiang and Chongfeng Hu, *University of Illinois at Urbana-Champaign;* Arkady Kanevsky, *NetApp;* Yuanyuan Zhou, *University of Illinois at Urbana-Champaign*

Parity Lost and Parity Regained

Andrew Krioukov and Lakshmi N. Bairavasundaram, *University of Wisconsin, Madison;* Garth Goodson, Kiran Srinivasan, and Randy Thelen, *NetApp;* Andrea C. Arpaci-Dusseau and Remzi H. Arpaci-Dusseau, *University of Wisconsin, Madison*

Noon–1:30 p.m. Lunch (on your own)

1:30 p.m.–3:00 p.m. Thursday

CPUS, COMPILERS, AND PACKETS, OH MY!

Enhancing Storage System Availability on Multi-Core Architectures with Recovery-Conscious Scheduling

Sangeetha Seshadri, *Georgia Institute of Technology;* Lawrence Chiu, Cornel Constantinescu, Subashini Balachandran, and Clem Dickey, *IBM Almaden Research Center;* Ling Liu, *Georgia Institute of Technology*

Improving I/O Performance of Applications through Compiler-Directed Code Restructuring

Mahmut Kandemir and Seung Woo Son, *Pennsylvania State University;* Mustafa Karakoy, *Imperial College, UK*

Measurement and Analysis of TCP Throughput Collapse in Cluster-based Storage Systems

Amar Phanishayee, Elie Krevat, Vijay Vasudevan, David G. Andersen, Gregory R. Ganger, Garth A. Gibson, and Srinivasan Seshan, *Carnegie Mellon University*

3:30 p.m.–5:00 p.m. Thursday

WHERE DID WE GO WRONG?

Portably Solving File TOCTTOU Races with User-Mode Path Resolution

Dan Tsafrir, *IBM T.J. Watson Research Center;* Tomer Hertz, *Microsoft Research;* David Wagner, *University of California, Berkeley;* Dilma Da Silva, *IBM T.J. Watson Research Center*

EIO: Error-handling Is Occasionally Correct

Haryadi S. Gunawi, Cindy Rubio Gonzalez, Ben Liblit, Andrea C. Arpaci-Dusseau, and Remzi H. Arpaci-Dusseau, *University of Wisconsin, Madison*

An Analysis of Data Corruption in the Storage Stack

Lakshmi N. Bairavasundaram, *University of Wisconsin, Madison;* Garth Goodson, *NetApp;* Bianca Schroeder, *Carnegie Mellon University;* Andrea C. Arpaci-Dusseau and Remzi H. Arpaci-Dusseau, *University of Wisconsin, Madison*

6:00 p.m.–7:30 p.m. Conference Reception

Friday, February 29

9:00 a.m.–10:30 a.m. Friday

BUFFERS, POWER, AND BOTTLENECKS

BPLRU: A Write Buffer Management Scheme to Enhance Random Write Performance in Flash Storage

Hyojun Kim and Seongjun Ahn, *Samsung Electronics*

Write Off-loading: Practical Power Management for Enterprise Storage

Dushyanth Narayanan, Austin Donnelly, and Antony Rowstron, *Microsoft Research Cambridge*

Avoiding the Disk Bottleneck in a Deduplication Storage System

Benjamin Zhu, *Data Domain;* Kai Li, *Data Domain and Princeton University;* Hugo Patterson, *Data Domain*

11:00 a.m.–12:30 p.m. Friday

COMPLIANCE AND PROVISIONING

Towards Compliant Data Retention with Probe Storage on Patterned Media

Pieter Hartel and Leon Abelmann, *University of Twente, The Netherlands*

SWEEPER: An Efficient Disaster Recovery Point Identification Mechanism

Akshat Verma, *IBM India Research Lab;* Kaladhar Voruganti, *NetApp;* Ramani Routray, *IBM Almaden Research Center;* Rohit Jain, *Independent*

Using Utility to Provision Storage Systems

John D. Strunk, *Carnegie Mellon University;* Eno Thereska, *Microsoft Research Cambridge;* Christos Faloutsos and Gregory R. Ganger, *Carnegie Mellon University*

Register Today!

Register Online: http://www.usenix.org/fast2008

Early Bird Registration Deadline: Friday, February 8, 2008

Questions? Email: fast08_reg@usenix.org Phone: (510) 528-8649