

Tim Kaldewey

Curriculum Vitae

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EDUCATION

Ph. D., Computer Science, University of California, Santa Cruz, March 2010

Thesis: *Predictable High-Performance Data Management – Leveraging System Resource Characteristics to Improve Performance and Predictability*

Advisor: Prof. Scott Brandt

Committee members: Prof. Andrea Di Blas, Prof. Charlie McDowell, Prof. Richard Hughey, Oracle Architect Eric Sedlar

M. S., Computer Science, University of California, Santa Cruz, March 2008

Thesis: *Virtualizing Storage Performance*

Advisor: Prof. Scott Brandt

M. S., Network Engineering, Institute Eurecom, Sophia Antipolis, FRANCE & University of Technology Darmstadt, GERMANY, September 2004

Thesis: *Location Tracking Services, Business Case: Incident command post for emergency response*

Advisor: Prof. Pascal Felber

HONORS

Best paper award	SIGMOD 2010
Best paper award	RTAS 2008
Oracle Fellowship	2008-2010
University of California Regent's Fellowship	2005, 2006
Eurecom Scholarship	2003

RESEARCH INTERESTS

High-performance and large-scale data management on parallel systems

System resource management to guarantee application performance

EMPLOYMENT HISTORY

- October 2010–present **Assistant Adjunct Professor**, Computer and Information Science Department, University of Pennsylvania, Philadelphia.
Guest Lectures on selected topics from systems, architecture, and parallel programming. Seeking research collaboration.
- November 2010–present **Research Staff Member**, IBM Almaden Research – Database Technologies, San Jose, California
Ongoing research on high-performance data management on emerging parallel architectures, large-scale distributed systems, and in-memory storage systems.
[publications C12, B1]

- April 2008–November 2010 **Senior Researcher**, Oracle Corporation, Server Technologies – Special Projects, Redwood Shores, California
Research on high-performance data management on parallel systems. Developed novel parallel algorithms for large-scale data management on emerging parallel architectures, e.g. multi-core CPUs, vector units, graphics processors. Prototype implementations demonstrated performance increases of more than an order of magnitude. [publications C8-11, J1-2]
Technology transfers to product groups, e.g. parallel string comparison, parallel memory copy, parallel join.
- January 2006–March 2008 **Graduate Student Researcher**, Real Time Lab – Storage Systems Research Center (SSRC), Department of Computer Science, University of California Santa Cruz.
Research on virtualizing storage performance within a distributed system including disk scheduling, caching and networking. [C4, C5, C7]
Investigated virtualization of storage devices using real-time scheduling techniques. Developed a disk scheduler that provides perfect isolation of workloads and performance guarantees in shared storages system. Implemented prototype as Linux kernel module. [C6]
Designed an extension for distributed filesystems to accelerate access to *in-flight* data, i.e. data currently in transit in a storage system.
Added support for firm real-time processing to an integrated real-time scheduler for the Linux 2.6 kernel. Firm real-time workloads have no value when deadlines are missed but parts may be skipped, e.g. B-frames in a video stream. [C2,C3]
- June 2007–September 2007 **Research Intern**, Oracle Corporation, Server Technologies – Special Projects, Redwood City, California
Research on relational database functions for parallel systems. Developed parallel algorithms for core database functions including index search, post-Iter and join. Implemented and evaluated prototypes running on graphics cards, multi-core CPUs and vector units. [C9]
- June 2006–September 2006 **Research Intern**, IBM Almaden Research Center, San Jose, California
Research on Storage QoS. Developed and evaluated a Real-Time disk scheduler that implements a virtual disk, providing perfect isolation between multiple workloads on a shared disk. The prototype was implemented as a Linux kernel device driver and uses disk (time) utilization as a metric of storage performance. [C6]
- March 2004–August 2005 **Assistant Research Engineer**, SAP Research, Palo Alto, California
Designed and developed **SAP Location Service Engine**. Basic functionality included display of real-time location(s) inside a building, indoor navigation, restricted area access alerts, and proximity search. Prototype applications comprised an incident command post for emergency response scenarios and asset tracking. The system is independent from specific sensing technologies and interfaces with the SAP AutoID node infrastructure. [P1-P3, W1]

- September 2000–March 2003 **Technical Editor**, Lufthansa Technik AG, Aircraft Systems Engineering Airbus Fleet, Frankfurt Airport, GERMANY
Managed maintenance schedule for Lufthansa’s Airbus fleet in SAP R/3, ensuring on-time compliance with aviation authority requirements, manufacturer specifications, and Lufthansa safety standards. This position required security clearance for unrestricted hangar & airport access to verify compliance with ordered changes.
- September 1997–December 2000 **Network Specialist**, Institute of Management and Logistics, University of Technology Darmstadt, GERMANY
Managed Novell Netware & Windows network. Responsible for roll out of Win NT 4.0, W2K and Norton Anti Virus Enterprise Edition. Designed and implemented security policies for application and file server access.
- December 1996–July 1997 **Network Specialist**, IT services, Software AG systems, Darmstadt, GERMANY
Managed Novell Netware & Windows network. Performed troubleshooting of network issues, analyzed network performance and suggested improvements of network infrastructure. Migration from a Token Ring to an Ethernet network.
- January 1996–September 1996 **Network Specialist**, IT department, Anneliese Zementwerke AG Ennigerloh, GERMANY
Managed Novell Netware, Windows & SAP R3 servers. Conducted network performance analysis, designed network infrastructure for subsidiaries, set up WAN connectivity to corporate data center, designed and implemented a security policies for Novell and Windows networks.

TEACHING EXPERIENCE

- November 2011 **Guest Lecture** in CIS 565 – GPU Programming and Architecture, Department of Computer and Information Science, University of Pennsylvania.
Programming GPUs for database applications.
- November 2011 **Guest Lecture** in CIT 593 – Computer Systems I, Department of Computer and Information Science, University of Pennsylvania.
x86 Architecture.
- August 2010 **Workshop** on GPU programming, Oracle Labs.
Organized workshop including guest speaker for lecture on GPU architecture. Gave lectures on “Introduction to GPU programming” and “Optimizations for data-intensive applications”.
- February 2010 **Workshop** on Architecture Aware Programming, Oracle Special Projects & SunLabs.
Co-organized workshop and prepared material on optimizing memory access patterns and performance.
- March 2009 **Guest Lecture** in CMPE 220 – Advanced Parallel Programming, Department of Computer Engineering, University of California Santa Cruz.
SSE Vector programming on x86 architectures.
- March 2008 **Guest Lecture** in CMPE 220 – Advanced Parallel Programming, Department of Computer Engineering, University of California Santa Cruz.
SSE Vector programming on x86 architectures.
- September 2005–December 2005 **Teaching Assistant** for CMPS 111 – Introduction to Operating Systems (Upper division undergraduate class), Department of Computer Science, University of California Santa Cruz.
Gave lectures on programming and homework assignments. Supervised students during lab hours. Graded homework and programming assignments. Programming assignments comprised implementing a shell, a CPU scheduler, multitasking, and a file system.

PUBLICATIONS

Conference & Workshop Papers

- C12. T. Kaldewey, S. Tata, E. Shekita., “Clydesdale: Structured Data Processing on MapReduce”, *15th International Conference on Extending Database Technology (EDBT’12)*, Berlin, GERMANY, March 27–30, 2012.
- C11. C. Kim, Jatin C., N. Satish, E. Sedlar, A. Nguyen, T. Kaldewey, V. Lee, S. Brandt, P. Dubey, “FAST: Fast Architecture Sensitive Tree Search on Modern CPUs and GPUs”, *2010 ACM SIGMOD/PODS Conference (SIGMOD’10)*, Indianapolis, IN, June 6–11, 2010. **Best paper award**
- C10. C. Kim, E. Sedlar, J. Chhugani, T. Kaldewey, A. Nguyen, A. Di Blas, V. Lee, N. Satish, P. Dubey, “Sort vs. Hash Revisited: Fast Join Implementation on Modern Multi-Core CPUs”, *35th International Conference on Very Large Databases (VLDB’09)*, Lyon, FRANCE, August 24–28, 2009
- C9. T. Kaldewey, A. Di Blas, J. Hagen, and E. Sedlar, “Parallel Search on Video Cards”, *1st USENIX Workshop on Hot Topics in Parallelism (HotPar’09)*, Berkeley, California, March 30–31, 2009
- C8. T. Kaldewey, A. Di Blas, J. Hagen, E. Sedlar, and S. Brandt, “Memory Matters”, *Work in Progress in the 29th IEEE Real-Time Systems Symposium (RTSS’08)*, Barcelona, SPAIN, November 30 – December 3, 2008.
- C7. Scott Brandt, Carlos Maltzahn, Anna Povzner, Roberto Pineiro, Andrew Shewmaker, and Tim Kaldewey, “An Integrated Model for Performance Management in a Distributed System” *Workshop on Operating Systems Platforms for Embedded Real-Time applications (OSPERT’08)*, Prague, Czech Republic, July 1 2008
- C6. T. Kaldewey, T. M. Wong, R.A. Golding, A. Povzner, and S. Brandt, “Virtualizing Disk Performance”, *14th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS’08)*, Saint Louis, Missouri, April 22–24, 2008. **Best paper award**
- C5. A. Povzner, T. Kaldewey, S. Brandt, R. Golding, T. Wong, and C. Maltzahn, “Efficient Guaranteed Disk Request Scheduling with Fahrrad”, *2008 Eurosys conference (Eurosys’08)*, Glasgow, UK, March 31 – April, 4 2008
- C4. D. Bigelow, S. Iyer, T. Kaldewey, R. Pineiro, A. Povzner, S. Brandt, R. Golding, T. Wong, C. Maltzahn, “End-to-end performance management for scalable distributed storage”, *Petascale Data Storage Workshop Supercomputing (PDSW’07)*, Reno, Nevada, November 11, 2007.
- C3. C. Lin, T. Kaldewey, A. Povzner, and S. Brandt, “Diverse Soft Real-Time Processing in an Integrated System”, *27th IEEE Real-Time Systems Symposium (RTSS’06)*, Rio de Janeiro, BRAZIL, December 5–8, 2006.
- C2. T. Kaldewey, C. Lin, and S. Brandt, “Firm Real-Time Processing in an Integrated Real-Time System”, *Work in Progress in the 12th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS’06)*, San Jose, California, April 4–7, 2006.
- C1. P. Felber, T. Kaldewey, and S. Weiss, “Proactive Hot Spot Avoidance for Web Server Dependability”, *23rd IEEE Symposium on Reliable and Distributed Systems (SRDS’04)*, Florianopolis, BRAZIL, October 18–20, 2004.

Journal Papers

- J2. A. Di Blas, T. Kaldewey, “Data Monster”, **IEEE spectrum**, Volume 46, Issue 9, pp. 46-51, September, 2009.
- J1. T. Kaldewey, “Programming Video Cards for Database Applications”, **USENIX ;login**, Volume 34, Issue 4, pp. 21-34, August, 2009.

Books

- B1. T. Kaldewey, A. Di Blas “Large-Scale GPU Search”, **GPU Computing Gems – Jade Edition**, Chapter 1, pp. 3-14, Morgan Kaufmann Publishers, 2011.

Patents

- P3. T. Kaldewey, S. Pei, and Samir Raiyani, “Incident command post”, SAP Research, Palo Alto, California, filed Mar 24, 2006. **European Patent Application no. EP 06006156**
- P2. T. Kaldewey, S. Raiyani, R. Pei, and S. Sobol, “System and method for navigating a facility”, SAP Research, Palo Alto, California, filed Mar 14, 2006, granted Sept. 8, 2009 **US Patent 7,587,274**
- P1. R. Pei, T. Kaldewey, and S. Raiyani, “Incident command post”, SAP Research, Palo Alto, California, filed Mar 28, 2005. **US Patent Application serial no. 11/092310**

White Papers

- W1. S. Raiyani, R. Pei and T. Kaldewey, “Innovative Architectures for Unified Incident Command and Decision Support”, **White Paper, SAP Research**, Palo Alto, California , October, 2004.

PROFESSIONAL ACTIVITIES

Membership in Professional Societies

ACM since 2007

IEEE since 2006

USENIX since 2009

Program Committee

6th IEEE International Conference on Networking, Architecture, and Storage (NAS'11),
Dalian, China, July 28–30, 2011

18th IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS'12),
Beijing, China, April 16–19, 2012

Reviewer

GPU Computing Gems – Jade Edition,
Morgan Kaufmann Publishers, 2011

36th International Conference on Very Large Data Bases (VLDB'10),
Singapore, September 13–17, 2010

28th IEEE International Conference on Distributed Computing Systems (ICDCS'08),
Beijing, China, June 17–20, 2008

5th USENIX Conference on File and Storage Technologies (FAST'07),
San Jose, California, February 13–16, 2007

12th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA'06),
Sydney, Australia, August 16–18, 2006

18th Euromicro Conference on Real-Time Systems (ECRTS'06),
Dresden, Germany, July 5–7, 2006

UNIVERSITY SERVICE

Institute Eurecom

2003-2004 Students' Representative

Department of Management Science, University of Technology Darmstadt

2002-2003 Committee Member for Faculty Recruitment

1997-2003 Students' Representative

1998-2000 Apprentice's Chairman