

Caixue Lin

CONTACT INFORMATION

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OBJECTIVE

I am looking for a job position in system topics, including (but not limited to) storage systems, file systems and real-time systems. I am also interested in any other software engineer positions.

EDUCATION

University of California, Santa Cruz, CA, USA

- Ph.D. in Computer Science (*Advisor: Prof. Scott A. Brandt*) June, 2006 (expected)
- M.S. in Computer Science (*Advisor: Prof. Scott A. Brandt*) March, 2003

Zhejiang University, China

- M.S. in Computer Science and Engineering March, 2001
- B.S. in Computer Science and Engineering June, 1998

TECHNICAL PROFILE

More than 10 years of C programming and extensive operating experience under various operating systems. 4 years of hands-on experience with *Linux kernel developing/debugging* and many years of hands-on experience with Windows SDK developing/debugging.

- Languages: C/C++, Java, Perl, SQL, x86 Assembly, Pascal, Shell Scripts
- Operating Systems: Linux/Unix, Solaris, MS-Windows/NT
- Development Skills: Linux kernel, Visual Studio, DAO, TCPIP/Socket and Matlab, etc

RESEARCH EXPERIENCE

June 2005 - Sept. 2005

Research Intern, IBM Almaden Research Center, San Jose, CA

- Project: manage storage performance as a resource. Generally, I focused on resource allocation, QoS support and performance management for the *Kybos* project, which provides virtualized storage in a distributed system of brick storage devices. Specifically,
 - I participated the implementation of a hierarchical I/O scheduler, *Zygaria* for the *Kybos* project. *Zygaria*, through the enforcement of simple reserve and limit policies on performance (in terms of bandwidth or I/O rate) resource allocation, provides a high degree of isolation between the pools of applications that share resources on a storage device, and also between the sessions of clients of the same application. *Zygaria* is implemented as a *Linux loadable kernel module*. I conducted extensive experiments to evaluate the performance of *Zygaria*.
 - Based on *Zygaria*, I designed and implemented an improved I/O scheduling algorithm, which tends to optimize the system performance in terms of total bandwidth by using batch I/O and adaptive outstanding queue while not violating the reserved bandwidth or I/O rate for any individual application.
- Partially due to my work, this project ended up with one patent application and one published paper.

April 2002 - Present

Research Assistant, University of California, Santa Cruz

- Research in the area of *CPU scheduling*, including resource allocation/reclaiming for soft real-time applications in an integrated system; particularly extending the approach to resource allocation and I/O

scheduling in storage systems. Implemented an effective slack (unreserved or unused CPU budget) reclaiming algorithm in *Linux 2.6 kernel*.

- Implemented Quality of Control in our RBED real-time framework in *Linux 2.4 kernel*. The system now provides discrete and continuous QoS support for adaptive applications.
- Proposed a resource allocation and scheduling model for processing management and based on the model implemented an integrated *CPU scheduler RBED (Rate-Based Earliest Deadline)* in *Linux 2.4 kernel*. RBED uses rate-based resource allocation and dynamic rate adjustment to achieve separate control of the two components of scheduling, resource allocation and delivery.
- Preliminarily implemented a basic *Object-Based File System (OBFS)* in *Linux 2.4 kernel*.

Sept. 1998 - March 2001

Research Assistant, Zhejiang University, China

- Various projects design and development (using C and C++) in networking, embedded and real-time operating system and distributed database systems.

March 1997 - June 1998

Research Assistant, Zhejiang University, China

- Participated and implemented a National 863 Project: A cooperative quality design and management system, in which multiple design agents work simultaneously on a same project by solving the conflicts via on-line collaborating methods through appropriate network protocols (TCP/IP or UDP).

WORK EXPERIENCE

January 2002 - March 2002

Teaching Assistant, University of California, Santa Cruz

- *Java Programming*: Duties at various times have included office hours, leading weekly computer lab exercises and grading.

May 2001 - July 2001

Summer Intern, Huaxia Bank, Hangzhou, China

- Participated a project on implementing a set of effective SQL interfaces to a distributed accounting database system of Huaxia Bank, Hangzhou.

June 1998 - Sept. 2000

Research Intern, Zhejiang University Computer Co, China

- Summer 2000: Participated and implemented the critical functionalities, such as small-scale kernel, mini graphic browser (W3C Protocol) and wireless remote control interface, etc, for an embedded operating system: HBOS.
- Summer 1999: Participated and developed an Internet video chatting system, EZChat, for Ezonics Co, USA. (Using MFC and DAO)
- Summer 1998: Designed and implemented the application side of the 97 Project (a large-scale distributed database system based on Oracle) for Hangzhou Tele-Communication Co (China).

SELECTED PUBLICATIONS

- Theodore M. Wong, Richard A. Golding, Caixue Lin and Ralph A. Becker-Szendy. "Zygaria: storage performance as a managed resource", in *Proceedings of the 12th IEEE Real-Time and Embedded Technology and Applications Symposium*, April 2006.
- Caixue Lin and Scott A. Brandt, "Improving Soft Real-Time Performance Through Better Slack Reclaiming", *2005 IEEE Real-Time Systems Symposium*, Miami USA, December, 2005.
- Scott A. Brandt, Scott Banachowski, Caixue Lin, and Joel Wu, "Developing a Complete Integrated Real-Time System", *Workshop on Operating Systems Platforms for Embedded Real-Time applications (OSPERT'05)*, held in conjunction with the 17th Euromicro Conference on Real-Time Systems, Palma de Mallorca, Spain, July 2005.
- Caixue Lin and Scott A. Brandt, "Efficient Soft Real-Time Processing in an Integrated System", *Work in Progress Session for the 2004 IEEE Real-Time Systems Symposium*, Lisbon Portugal, December, 2004.
- Pau Marti, Caixue Lin, Scott A. Brandt, Manel Velasco, and Josep M. Fuertes, "Optimal State Feedback Based Resource Allocation for Resource-Constrained Control Tasks", in *Proceedings of the 25th IEEE Real-Time Systems Symposium (RTSS 2004)*, pages 161-172, December, 2004.
- Manel Velasco, Josep M. Fuertes, Caixue Lin, Pau Marti and Scott Brandt, "A Control Approach to Bandwidth Management in Networked Control Systems", In *30th Annual Conference of the IEEE Industrial Electron-*

ics Society (IECON04), Busan, Korea, November, 2004.

- **Caixue Lin, Pau Marti, Scott A Brandt, Scott Banachowski, Manel Velasco and Josep M. Fuertes, "Improving Control Performance Using Discrete Quality of Service Levels in a Real-Time System", 10th IEEE Real-Time and Embedded Technology and Applications Symposium. Work in Progress Session, RTAS, 2004.**
- **Scott A. Brandt, Scott Banachowski, Caixue Lin and Timothy Bisson, "Dynamic integrated scheduling of soft real-time and non-real-time processes", in Proceedings of the 24th IEEE Real-Time Systems Symposium (RTSS 2003), pages 396-407, Dec. 2003.**
- **Caixue Lin, "Port OBFS into Linux 2.4.9", Technical Report, Computer Science Department, University of California, Santa Cruz, September 2002**

AFFILIATIONS

Student Member of IEEE.

HONORS AND AWARDS

- **UC Regents Fellowship, University of California, Santa Cruz** 2001
- **Distinguished graduating student award (5%, Graduate School), Zhejiang University, China** 2001
- **Kwang-Hua fellowships of Kwang-Hua Foundation, Zhejiang University, China** 1999, 2000
- **EastCom Prize awarded by EastCom Co. (top 15 graduate students), Zhejiang University, China** 1999
- **Distinguished graduating student award (5%, undergraduate), Zhejiang University, China** 1998
- **First Prize, University Programming Contest (with Lin Zhou and Jie Lin), Zhejiang University, China** 1997
- **Outstanding Student Awards and Scholarships, Zhejiang University, China** 1994, 1995, 1996, 1997

REFERENCES

- **Prof. Scott A. Brandt** UC Santa Cruz, sbrandt@cs.ucsc.edu, (831)459-5042
- **Prof. Darrell D. E. Long** UC Santa Cruz, darrell@cs.ucsc.edu, (831)459-2616
- **Prof. Ethan L. Miller** UC Santa Cruz, elm@cs.ucsc.edu, (831)459-1222
- **Dr. Richard Golding** IBM Almaden Research Center, rgolding@us.ibm.com, (408)927-1899