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### RESEARCH INTEREST

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My primary research interest is in speculative compiler optimizations that leverages hardware support for transactional execution. I started my PhD program evaluating a compiler that leveraged transactional support to automatically parallelize serial applications, as part of the IBM PERCS project. Later on at 2006, I interned with IBM Research helping design and patent the hardware support for transactional execution in Bluegene/Q, which has been released to the public recently. After returning, I continued my work on compilers researching ways to speculate on memory ordering and, recently, alias analysis using hardware transactional support.

### PUBLICATIONS

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- Wonsun Ahn, Yuelu Duan, Josep Torrellas. Aggressive Alias Analysis Using Atomic Region Support. *Submitted to a conference.*
- Yuelu Duan, Xing Zhou, Wonsun Ahn, Josep Torrellas. Atom-X: Adaptive and Deterministic Execution via Collision-Aware Commit of Atomic Blocks. In *International Symposium on High Performance Computer Architecture (HPCA)*, February 2012.
- Wucherl Yoo, Kevin Larson, Sangkyum Kim, Wonsun Ahn, Roy H. Campbell, and Lee Baugh. Automated Fingerprinting of Performance Pathologies Using Performance Monitoring Units (PMUs). In *USENIX Workshop on Hot Topics in Parallelism (HotPar)*, May 2011.
- Xuehai Qian, Wonsun Ahn and Josep Torrellas. ScalableBulk: Scalable Cache Coherence for Atomic Blocks in a Lazy Environment. In *International Symposium on Microarchitecture (MICRO)*, December 2010.
- Wonsun Ahn, Shanxiang Qi, Jae-Woo Lee, Marios Nicolaides, Xing Fang, Josep Torrellas, David Wong and Samuel Midkiff. BulkCompiler: High-Performance Sequential Consistency through Cooperative Compiler and Hardware Support. In *International Symposium on Microarchitecture (MICRO)*, December 2009.
- James Tuck, Wonsun Ahn, Luis Ceze and Josep Torrellas. SoftSig: Software-Exposed Hardware Signatures for Code Analysis and Optimization. In *IEEE Micro Special Issue: Micro's Top Picks from Computer Architecture Conferences (TOPPICKS)*, January 2009.
- Pablo Montesinos, Matthew D. Hicks, Wonsun Ahn, Samuel T. King and Josep Torrellas. Lessons Learned During the Development of the CapoOne Deterministic Multiprocessor Replay System. In *Workshop on the Interaction between Operating Systems and Computer Architecture (WIOSCA)*, June 2009.
- Josep Torrellas, Luis Ceze, James Tuck, Calin Cascaval, Pablo Montesinos, Wonsun Ahn and Milos Prvulovic. The Bulk Multicore for Improved Programmability. In *Communications of the ACM (CACM)*, December 2009.
- James Tuck, Wonsun Ahn, Luis Ceze and Josep Torrellas. SoftSig: Software-Exposed Hardware Signatures for Code Analysis and Optimization. In *International Conference on Architectural Support for Programming Languages and Operating Systems (ASPLOS)*, March 2008.
- Wei Liu, James Tuck, Luis Ceze, Wonsun Ahn, Karin Strauss, Jose Renau and Josep Torrellas. POSH: A TLS Compiler that Exploits Program Structure. In *Symposium on Principles and Practice of Parallel Programming (PPoPP)*, March 2006.

### PATENTS

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- U.S. Patent #20110219381, Multiprocessor system with multiple concurrent modes of execution., International Business Machines September 2011.
- U.S. Patent #20110219191, Reader set encoding for directory of shared cache memory in multiprocessor system., International Business Machines September 2011.

## AWARDS & HONORS

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### Award Publications

- James Tuck, Wonsun Ahn, Luis Ceze and Josep Torrellas. SoftSig: Software-Exposed Hardware Signatures for Code Analysis and Optimization. In *IEEE Micro Special Issue: Micro's Top Picks from Computer Architecture Conferences (TOPPICKS)*, January 2009.

### Samsung Frontier Membership, Founding Member (<http://www.samsung.com>) *June 1999-*

- Was invited to join an academic forum supported by Samsung

### SK Telecom Fellowship (<http://www.sktelecom.com/>) *1996*

- Received award and financial support for college education

## EXPERIENCE

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### IBM T.J. Watson Center (<http://www.watson.ibm.com>) *May 2006-January 2007*

#### Bluegene/Q Memory System Team, Intern

- Manager: Martin Ohmacht
- Developed innovative memory system design to support thread level speculation(TLS) and transactional memory(TM)
- Developed detailed hardware simulator to model potential design points
- Resulted in two patents (see above).

### IBM T.J. Watson Center (<http://www.watson.ibm.com>) *May 2005-January 2006*

#### IBM PERCS Project, Collaborator

- Manager: Calin Cascaval
- Evaluated thread level speculation(TLS) instrumented code on simulator
- Analyzed detailed memory system behavior, proving existence of prefetching effects

### University of Illinois at Urbana Champaign Department of Computer Science (<http://www.cs.uiuc.edu>) *August 2004-December 2010*

#### Graduate Research Assistant

### University of Illinois at Urbana Champaign Department of Computer Science (<http://www.cs.uiuc.edu>) *Spring Semesters of 2006, 2008, 2009*

#### Graduate Teaching Assistant

- Graded and assisted students in CS 533, Parallel Computer Architectures
- Gave lectures, prepared and graded homeworks, assisted course projects

### Bluebird Soft Incorporated, Korea *June 1999-February 2003* (<http://www.bluebird.co.kr>)

#### Lead Developer Mobile Software Platforms / Messaging Systems

- Implemented Windows CE based OS on hand held computers developed by company
- Sold \$20 million worth of industrial hand held computers at the first year of release
- Developed video enabled mail & messaging system for Broba(broadband) Initiative of NTT in Japan
- Developed mail service as part of groupware for Seoul National University, Korea
- Developed video streaming service with ETRI(Electronics and Telecommunications Research Institute), Korea

## EDUCATION

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### University of Illinois at Urbana Champaign *August 2004-*

#### Ph.D. Candidate, Computer Science

- Advisor: Professor Josep Torrellas
- GPA: 3.97/4.0

**Seoul National University**

*March 1996-February 2004*

**Bachelor of Computer Science and Engineering, Summa Cum Laude**

- Wrote thesis "Security issues facing the implementation of RSA", advisor Kunsoo Park
- Built a hand held PC with touch screen from ground up using a Motorola chip and the MicroC OS
- GPA: 3.91/4.3

## **SKILLS**

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- Programming in languages including C++, Java, and PHP.
  - C++:
    - 13 years experience.
    - Wrote a multithreaded instant messaging server using POSIX threads.
    - Wrote device drivers for the Windows CE OS.
    - Wrote Windows GUI applications, including Direct3D
  - PHP:
    - 4 years experience.
    - Wrote commercial webmail solutions supporting IMAP/POP3/SMTP.
- Database experience ORACLE/MYSQL, including programming and administration (for 700,000 users).
- Document creation in  $\LaTeX$ .
- 13 years UNIX/LINUX experience, including software development and system administration (primarily Redhat/Linux).