

# Seung-Jai Min

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## OBJECTIVE

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To obtain a position in the field of compilers, middleware, and performance evaluation and benchmarking

## RESEARCH INTERESTS

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The focus of my research has been in the areas of (1) compilers, optimization, and the interaction between compilers and runtime systems for large-scale parallel applications, and (2) performance modeling and benchmarking for rapidly-evolving architectures, including current multicore clusters, GPGPUs and future manycore systems. I have worked on the following research topics:

- Compiler optimizations for OpenMP shared memory programs on distributed-memory clusters and GPGPUs
- Message-passing communication library design for irregular applications
- Performance auto-tuning and analysis tool development for high-performance computing
- Characterization of benchmark applications on emerging architectures
- Automatic parallelizing compilers for multicore architectures

## EDUCATION

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Ph.D. in Electrical and Computer Engineering, Purdue University, West Lafayette, IN, expected in March 2009

Thesis title: Optimizing Shared-Memory Programs for Distributed-Memory Clusters

Advisor: Professor Rudolf Eigenmann

M.S. in Electrical Engineering and Computer Science, Seoul National University, Seoul, Korea, February 1995

Thesis title: A Neural-Network Processor Design using Stochastic Computation

Advisor: Professor Soo-Ik Chae

B.S. in Electrical Engineering, Sogang University, Seoul, Korea, February 1993

## RESEARCH EXPERIENCE

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### Research Assistant

Department of ECE, Purdue University, West Lafayette, IN

- Lean Distributed Shared Memory (LDSM) System Sep. 2005 – present  
I created LDSM, a *false sharing free region-based software DSM*, which compiles and executes OpenMP shared-memory programs on clusters (<http://www.ecn.purdue.edu/ParaMount/LDSM>). In LDSM software package, I implemented a novel shared data access analysis technique, which combines the compile-time analysis and the runtime system's precise memory access analysis. The LDSM compiler is based on Cetus compiler infrastructure and the LDSM runtime is written in C with MPI library calls for communication.
- OpenMP to GPGPU: An OpenMP Compiler for Hardware Accelerators Jan. 2008 – present  
As a lead researcher in this project, I am developing an OpenMP-to-GPU translator and compiler optimization techniques to efficiently convert OpenMP programs, both regular and irregular OpenMP programs, into CUDA programs to leverage parallelism in CUDA-enabled GPUs.

- Cetus Source-to-Source Compiler and Automatic Parallelizing Compiler Project Jan. 2003 – present  
I am one of the primary developers of Cetus, a source-to-source restructuring compiler infrastructure for C programs (<http://cetus.ecn.purdue.edu/>). I have implemented reduction transformation and alias analysis passes and several code generators for OpenMP compilers, such as OpenMP-to-MPI and OpenMP-to-GPGPU.

**Teaching Assistant** September 2006 – December 2007  
**The Social Entrepreneurship Initiative and Department of ECE, Purdue University, West Lafayette, IN**

- Web developer: I developed a database program using PHP/MySQL for a nation-wide Idea-to-Product competition.

**Summer Intern, Synopsis Inc., Mountain View, CA** May 2005 – August 2005

- Binding-MX Project: I maintained the mixed VHDL/Verilog simulator for VCS-MX simulation tool set.

**Research Engineer, LG Electronics, Seoul, Korea** January 1995 – August 2000

- A single-Chip HDTV video/audio decoder project: I was an embedded processor architect and RTL-level logic designer for five successful multi-media chip projects.

## SELECTED PUBLICATIONS

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S. Lee, **Seung-Jai Min**, and R. Eigenmann, **OpenMP to GPGPU: A Compiler Framework for Automatic Translation and Optimization**, *Symposium on Principles and Practice of Parallel Programming (PPoPP'09)*, Feb 2009 (AR: 24%)

H. Bae, L. Bachege, S. Lee, S. Lee, **Seung-Jai Min**, R. Eigenmann, and S. Midkiff, **Cetus: A Source-to-source Compiler Infrastructure for Multicores**, *14<sup>th</sup> Workshop on Compilers for Parallel Computing (CPC'09)*, January 2009

**Seung-Jai Min**, **Parallel Program Analysis and Optimization for High-Performance Computing**, *Int. Conf. on High Performance Computing, Networking, Storage and Analysis (SC'08), Doctoral Show Case Session*, Nov 2008 (AR: 26%)

**Seung-Jai Min** and R. Eigenmann, **Optimizing Irregular Shared-Memory Applications for Clusters**, *Proceedings of the 22<sup>nd</sup> ACM International Conference on Supercomputing (ICS'08)*, June 2008 (AR: 26%)

A. Basumallik, **Seung-Jai Min** and R. Eigenmann, **Programming Distributed Memory Systems Using OpenMP**, *International Workshop on High-Level Parallel Programming Models and Supportive Environments (HIPS'07)*, 2007

T. Johnson, S. Lee, **Seung-Jai Min** and R. Eigenmann, **Can Transactions Enhance Parallel Programs?**, *Proceedings of the 19th International Workshop on Languages and Compilers for Parallel Computing (LCPC'06)*, November 2006

**Seung-Jai Min** and R. Eigenmann, **Combined Compile-time and Runtime-driven, Pro-active Data Movement in Software DSM Systems**, *Proceedings of the 7th Workshop on Languages, Compilers, and Run-time Support for Scalable Systems (LCR'04)*, October 2004

**Seung-Jai Min**, A. Basumallik, and R. Eigenmann, **Optimizing OpenMP Programs on Software Distributed Shared Memory Systems**, *International Journal of Parallel Programming*, vol. 31, pp. 225-249, June 2003

**Seung-Jai Min**, A. Basumallik, and R. Eigenmann, **Supporting Realistic OpenMP Applications on a Commodity Cluster of Workstations**, *International Workshop on OpenMP Applications and Tools (WOMPAT'03)*, 2003

A. Basumallik, **Seung-Jai Min**, and R. Eigenmann, **Towards OpenMP execution on software distributed shared memory systems**, *Proceedings of the 4th Int'l Symposium on High Performance Computing (WOMPEI'02)*, May 2002

**Seung-Jai Min**, S. Kim, M. Voss, S. Lee, and R. Eigenmann, **Portable Compilers for OpenMP**, *International Workshop on OpenMP Applications and Tools (WOMPAT'01)*, July 2001

H. Kim, W. Yang, M. Shin, **Seung-Jai Min**, S. Bae, I. Park, **Multi-thread VLIW Processor Architecture for HDTV Decoding** *Proceedings of IEEE Custom Integrated Circuits Conference (CICC'00)*, May 2000, pp. 559-562.

## SKILLS

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Programming Languages: FORTRAN, C/C++, JAVA, TCP/IP, Perl, Python, Ruby, PHP, and MYSQL