

# Yanhua Sun

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## Education

Ph.D., Computer Science, August 2009 - , University of Illinois at Urbana-Champaign  
M.S., Computer Science, July 2008, Chinese Academy of Sciences, China  
B.S., Computer Science, July 2005, Shandong University, China

## Research Interests

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| Adaptive runtime systems               | Low level communication optimization   |
| Dynamic load balancing                 | Parallel state space search            |
| Performance analysis and visualization | Parallel molecular dynamics simulation |

## Awards

SC12 Honorable Mention for the George Michael Memorial HPC Fellowship, 2012  
IPDPS Travel-Support Grant Scholarship, 2012  
HPC Challenge Class 2 First Place Award with SC11, 2011  
Grad Cohort for Women in Computing Research Association (CRA-W) Travel Grant, 2011  
Liu Yongling Scholarship, Chinese Academy of Sciences, top 80 out of 30000, 2008  
Outstanding Graduate, Graduate University of Chinese Academy of Sciences, top 5%, 2008  
Chancellor Fellowship, highest honor in Shandong University, top 50 out of 30000, 2004  
First place in Qilu Software Design Contest, Shandong Computer Association, 2004  
First-rate Excellence Scholarship, Shandong University, top 5%, 2002, 2003, 2004

## Projects

**Gemini Interconnect.** I worked on designing and implementing an asynchronous message-driven runtime system on Gemini Interconnect for Cray XE6/XK6/XK7.

**Charm++:** A parallel C++ runtime system that provides processor virtualization and an adaptive implementation of MPI on top of Charm++ (AMPI). I am working on lower-level runtime system abstraction (LRTS) and load balancing strategies.

**NAMD:** I am working on performance optimization and scalability analysis in NAMD on BGP/BGQ/BlueWaters/Titan, which is a parallel molecular dynamics program designed for high-performance simulation of large biomolecular systems.

**Adaptive Framework for Parallel State Space Search:** I studied common performance issues of speculative computation, grain size control and load balancing in parallel state space search applications. I exploited three strategies to scale several benchmarks to 16K processors.

**Application System of Computation Chemistry (2006-2008)** My work involved designing the system architecture and developing code about 20000 lines for GridMol - a molecular modeling and visualization system.

## Publications

1. Sameer Kumar, **Yanhua Sun**, and Laxmikant V.Kalé, **Acceleration of an Asynchronous Message Driven Programming Paradigm on IBM Blue Gene/Q**, IEEE International Parallel & Distributed Processing Symposium, (IPDPS 2013).
2. **Yanhua Sun**, Gengbin Zheng, Chao Mei, Eric J. Bohm, Terry Jones, James C.Phillips and Laxmikant V.Kalé, **Optimizing Fine-grained Communication in a Biomolecular Simulation Application on Cray XK6**, ACM/IEEE Supercomputing Conference, (SC 2012).
3. **Yanhua Sun**, Gengbin Zheng, Ryan Olson, Terry Jones, and Laxmikant V.Kalé, **A uGNI-Based Asynchronous Message-driven Runtime System for Cray Supercomputers with Gemini Interconnect**, IEEE International Parallel & Distributed Processing Symposium, (IPDPS 2012).
4. **Yanhua Sun**, Gengbin Zheng, Pritish Jetley, and Laxmikant V. Kalé, **ParSSSE: An Adaptive Parallel State Space Search Engine**, Parallel Processing Letters, 21(3), P319338, September 2011.
5. Laxmikant V.Kalé, Anshu Arya, Abhinav Bhatele, Abhishek Gupta, Nikhil Jain, Pritish Jetley, Jonathan Lifflander, Phil Miller, **Yanhua Sun**, Ramprasad Venkataraman, Lukasz Wesolowski, and Gengbin Zheng, **Charm++ for Productivity and Performance: A Submission to the 2011 HPC Class II Challenge**, ACM/IEEE Supercomputing Conference, (SC 2011)
6. Chao Mei, **Yanhua Sun**, Gengbin Zheng, Eric J. Bohm, James C.Phillips, Chris Harrison, Laxmikant V. Kalé, **Enabling and Scaling Biomolecular Simulations of 100 Million Atoms on Petascale Machines with a Multicore-optimized Message-driven Runtime**, ACM/IEEE Supercomputing Conference, (SC 2011).
7. **Yanhua Sun**, Gengbin Zheng, Pritish Jetley, Laxmikant V. Kalé, **An Adaptive Framework for Large-scale State Space Search**, Workshop on Large-scale Parallel Processing (with IPDPS 2011), 2011.
8. **Yanhua Sun**, Bin Shen, Zhonghua Lu, Zhong Jin, Xuebin Chi **GridMol: a grid application for molecular modeling and visualization**, In Journal of Computer-Aided Molecular Design, Vol 22 No 2. P119-129. 2008.

#### Talk

1. Yanhua Sun **Optimizing Fine-grained Communication in a Biomolecular Simulation Application on Cray XK6**, ACM/IEEE Supercomputing (SC12), Salt Lake City, Utah.
2. Yanhua Sun **A uGNI-Based Asynchronous Message-driven Runtime System for Cray Supercomputers with Gemini Interconnect**, IEEE International Parallel & Distributed Processing Symposium, (IPDPS 2012), Shanghai, China.
3. Yanhua Sun **An Adaptive Framework for Large-scale State Space Search**, Workshop on Large-scale Parallel Processing (with IPDPS 2011), Anchorage, Alaska.

#### Poster

1. **Yanhua Sun** and Laxmikant V.Kalé **Scaling NANO Molecular Dynamic(NAMD) on Petascale machines using Charm++**, CRA-W Grad Cohort workshop, Boston, 2011