

# XIN DONG

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## OBJECTIVE

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- I am looking for a Software Engineer/Developer position. I have particular skills in operating systems, multi-threaded C/C++ programming, memory management optimization and kernel level development, etc.
- **Availability:** May 1st, 2012.

## EDUCATION

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- Ph.D., Computer Science, April 2012  
Northeastern University, Boston, MA, USA, GPA: 3.94/4.0
- M.S., Computer Science, March 2003  
Shanghai Jiaotong University, Shanghai, CHINA
- B.S., Mathematics, June 1991  
Fudan University, Shanghai, CHINA

## CURRENT RESEARCH

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**My Ph.D. research** focuses on operating systems, high performance computing, multi-threading, software parallelization methods/tools, code rewriting/debugging and parallel algorithms.

**The central part of my thesis** is a semi-automatic methodology using source-level transformation for Geant4 multi-threading (Geant4MT [http://geant4.cern.ch/support/download\\_MT\\_proto.shtml](http://geant4.cern.ch/support/download_MT_proto.shtml)).

**Techniques used include:** • a modified version of the GNU g++ parser • bisimulation using the DMTCP checkpointing package • run-time analysis using a SEGFAULT handler and selective memory protection • a non-standard extension to malloc for scalable multi-threading

**Other topics:** • bit-compatible parallelization of ILU(k) preconditioner • fast permutation multiplication in cache

### Impact of Geant4MT

- Geant4 is a *million-line* C++ program for Monte Carlo simulation. It is used by thousands of high energy physicists to simulate particle-matter interaction. It is now also widely used in medical research.
- In 2008, an international meeting was held at CERN to discuss the crisis in Geant4. The original design was single-threaded, and a roadmap to many-core computing was needed. My advisor and I were invited to attend, where my advisor presented my initial work.
- At the most recent Geant4 Collaboration Meeting (2011), one of the sessions was devoted wholly to my solution, Geant4MT. This is currently the only multi-threaded solution, and it provides linear scaling. I also gave a plenary talk in a summary session.
- There is a new release of single-threaded Geant4 every 6 months and the multi-threaded version must be kept in sync. Makoto Asai (SLAC, leader of the international Geant4 Collaboration) has recently hired a post-doc in part to support Geant4MT.

## PUBLICATIONS

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- Xin Dong and Gene Cooperman. A Bit-Compatible Parallelization for ILU(k) Preconditioning. 17th International Euro-Par Conference (Euro-Par 2011), pp. 66-77, 2011

- Xin Dong, Gene Cooperman and John Apostolakis. Multithreaded Geant4: Semi-automatic Transformation into Scalable Thread-Parallel Software. 16th International Euro-Par Conference (Euro-Par 2010), pp. 287-303, 2010
- Vlad Slavici, Xin Dong, Daniel Kunkle and Gene Cooperman. Fast Multiplication of Large Permutations for Disk, Flash Memory and RAM. 35th International Symposium on Symbolic and Algebraic Computation (ISSAC 2010), pp. 355-362, 2010

## WORK EXPERIENCE

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### Summer Internships

- Software Engineer, Oak Ridge National Laboratory (ORNL) Summer 2011
- Multi-threading, debugging and performance profiling tools on supercomputers such as CRAY-XT5 and IBM BG/P
- Software Engineer, European Organization for Nuclear Research (CERN) Summer 2010
- R&D: Multi-threading for Geant4, version 9.3. Testing, engineering and release plan
- Software Engineer, European Organization for Nuclear Research (CERN) Summer 2009
- R&D: Multi-threading for Geant4, version 9.2. Performance bottleneck analysis
- Software Engineer, European Organization for Nuclear Research (CERN) Summer 2008
- R&D: Multi-threading for Geant4, version 9.1 with geometric object sharing

### Full-time Positions

- Software Engineer, Distributed Computation Technology Center, Shanghai Sep 2000-Aug 2005
- SUPRENOC, an application built on HP OpenView to process alarm messages from various kind of network equipment. We implemented a system to fetch messages from an application based on OpenView (C/C++) and transfer them to a JRULER engine (JAVA). These messages fire the JRULER engine to activate the user-defined processing. The JRULER engine also subscribes messages from an application server (Weblogic). The final results generated by the JRULER engine are written back into the OpenView application.
  - 3G Portal, a BEA Tuxedo based backbone and a web based interface for both vendors and consumers
  - CDMA 3G CORBA Interface, a product consistent with one of CHINA TELECOM specifications
  - OLTP, a middleware similar to the BEA Tuxedo. This product has three subsystems for transaction processing, communication processing and data accessing respectively. I implemented a web based system to manage OLTP, which includes a JAVA applet, a lightweight webserver (C/C++) and a server-end application (C/C++).
  - Application Delivery System, an implementation for JNLP
- Software Engineer, Acetech Pte., Singapore Apr 2000-Aug 2000
- XML parser (Visual C++ and MS SQL server), a program implemented as a Windows system service to download a XML document and update to a local database
  - National serviceman administration system (PowerBuilder and Oracle)

Computer Chief, Wireless Branch of ZTE Corp., Shanghai Mar 1998-Mar 2000

- Measurement equipment management system (PowerBuilder, Visual C/C++, MS SQL server and Lotus Notes Domino Server), a system to manage checking, accepting, using and calibrating for measurement equipment

Software Engineer, Pudong Software Park, Shanghai Jul 1991-Feb 1998

- Social security system (PowerBuilder and Sybase), a two-layer system includes a distributed system that consists of several districts and a center; and a web based system to publish the social service information
- Hotel system (FoxPro and Novell network), a front end that includes check-in, check-out, restaurant service and grocery store service; and a back end that includes human resource, finance and office
- General accounting system with a C implementation and a FoxPro implementation

#### PROGRAMMING SKILLS

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- **Programming Languages:** C/C++, X86 Assembly, Java, Python, Perl, PowerBuilder
- **Web Technologies:** Apache Server, HTML, JavaScript, XML, SOAP, WSDL, UDDI
- **OS and Databases:** Linux/UNIX, Windows, MySQL, Oracle, MS SQL Server, Sybase
- **Distributed/Parallel Computing:** POSIX Threads, MPI, CORBA, J2EE, JNLP, RMI, .NET, Lotus Domino Server, BEA Tuxedo, HP OpenView
- **Others:** GDB, Totalview, Pfmom, Valgrind, VMware, SAGE, MATLAB, VMGL, SCIRun

#### INVITED WORKSHOP PRESENTATIONS

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- Geant4 Collaboration Meeting 2011 (Plenary Session)  
<https://indico.fnal.gov/contributionDisplay.py?sessionId=12&contribId=116&confId=4535>  
<https://indico.fnal.gov/contributionDisplay.py?sessionId=15&contribId=39&confId=4535>
- Geant4 Collaboration Workshop 2010  
<http://indico.cern.ch/sessionDisplay.py?sessionId=26&confId=102427#20101005>
- CERN Multi-Core R&D Meeting 2010  
<http://indico.cern.ch/conferenceDisplay.py?confId=96581>
- Geant4 Collaboration Workshop 2009 (Plenary Session)  
<http://indico.cern.ch/materialDisplay.py?contribId=30&sessionId=68&materialId=slides&confId=44566>
- CERN Multi-Core R&D Meeting 2008  
<http://indico.cern.ch/conferenceOtherViews.py?view=standard&confId=39836>
- Geant4 Collaboration Workshop 2008 (Plenary Session)  
<http://kds.kek.jp/materialDisplay.py?contribId=116&sessionId=26&materialId=slides&confId=2027>
- CERN Workshop on Virtualization and Multi-Core Technologies for LHC  
<http://indico.cern.ch/conferenceDisplay.py?confId=28823>

#### HONORS

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- Excellent graduate student, 2003, China
- Nokia graduate scholarship, 2001, China
- Excellent undergraduate student, 1991, China
- Second prize in the 4th Mathematics Summer Camp Contest for Undergraduate Students, 1989, China