Danhua Guo Ph.D.

CONTACT

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EDUCATION

University of California, Riverside Sept. 2005 – June 2010
Doctor of Philosophy, Computer Science and Engineering Department
Advisor: Professor and Chair, Laxmi N. Bhuyan
Research topic: Application-Oriented Networking
GPA 3.86/4.00: (Description of course projects available on webpage)

Beijing University of Technology (BJUT) Sept. 2001 - July 2005
Bachelor of Engineering, Advanced Class, College of Computer Science and Technology
GPA 3.72/4.00 88.76/100 Rank: 3rd in class of 420

PROFESSIONAL EXPERIENCE

Microsoft Corp. **Mountain View, CA, USA**
Software Development Engineer Sept. 2011 - Present

- Working on signal gathering and contextual ads selection in the Delivery Engine team at AdCenter.
- Owner of Publisher Store.
  - Handles Ad call validation and keyword exclusion and publisher data. Front door to keyword server.
  - Designed, implemented and documented AdUnit Classification feature
  - Wrote unit tests and P0 component tests.
- Owner of Index/Listing server.
  - Maps input keywords (from ads query) to Ad listings.
  - Designed, implemented and documented Category Matching feature.
  - Wrote unit tests and P0 component tests.

Cisco Systems Inc. **San Jose, CA, USA**
Software Engineer. System Engineering (SAVBU) July 2010 – Sept. 2011

- Performance tuning for Cisco 10G enic driver and userspace NIC driver
  - Enabled VTune and Oprofile to pinpoint the performance hotspots on different x86-based server platforms (Intel chipset and memory module combinations).
  - Resolved a synchronization bottleneck for enic and improved throughput by 5%.
- Userspace NIC driver
  - Developed connection teardown and concurrent connection features for RedHat MRG AMQP package.
  - Developed a command line tool to query device info similar to "ethtool".
  - Measured and fine-tuned throughput and latency performance using different system buffer and cache parameters.

- Cisco Enic support for VMware ESX
  - Provided driver support for VMware ESX network kernel development, i.e. control plane operations for Distributed Virtual Switch (DVS) and data plane operations for vSwitch.

Cisco Systems Inc. **San Jose, CA, USA**
College Intern June 2008 - Sept. 2008
- Developed an online scalable multithreaded L7-filter for multi-core based systems.
- Results won the 1st-place Award in the 2008 Cisco Intern Project Competition.

Supervisor: Jason Ding

International Affairs Office of Illinois Institute of Technology **Beijing, China**
Web Administrator July 2004 - Aug. 2005
- Network maintenance of the computer system in the office.
- Promotion of IIT in China, including communication with local government, translation and drafting of introduction paperwork.

Supervisors: Tim Zhang, Vivian Jin

TALKS

Cisco Systems Inc. **San Jose, CA, USA**
Sept. 2008

"*Nerdlunch*: A Scalable Multithreaded L7-filter Design for Native and Virtualized Multi-Core based Systems."

TECHNICAL SKILLS

Languages
- English (fluent), German (capable of reading), Mandarin Chinese (native).

Computer Languages
- *Software*: C/C++/C#, HTML/XML, Matlab/Maple, LaTex.
- *Script*: Kernel Shell, Python, MAYA MTL
- *Hardware*: MicroC/MicroCode, Verilog/VHDL, Assembly

Platforms
- *Operating System*: Windows, Unix/Linux, Solaris
- *Networking and simulators*: TCP/IP Stack, Intel IXA Workbench, SGI RASC, SimpleScalar, NePSim, Bochs, M5, Simics, VTune, Oprofile
- *Virtualization*: Xen, VMWare ESX/ESXi

RESEARCH INTERESTS

- Server architecture for fast network I/O processing, with focus on deep packet inspection
- OS scheduling for multi-core data centers
- Virtualization for data center/server consolidation; cloud computing
- High performance computing; parallel processing

ACADEMIC AND RESEARCH EXPERIENCE

University of California, Riverside

Research Assistant April 2006 - Present

- *"Application-Oriented Networking"*
  - Designed and implemented several scheduling algorithms for network applications on multicore web servers to accelerate network I/O processing.
  - Proposed a scalable multithreaded L7-filter software and corresponding optimized system schedulers for both Linux and Solaris. Results showed a 51% improvement on average in system throughput compared to naive multithreading.
  - Explored instruction level parallelism in the Linux TCP/IP stack.
  - Publication: [ANCS '08 L7][ANCS '09 Solaris][ANCS '10][INFOCOM '11][TON]
- *Performance Characterization of Virtualization*
  - Studied extensively on paravirtualization, particularly network overhead.
  - Proposed several multi-core schedulers in the virtual machine monitor to improve virtualized network performance by taking advantage of multi-core architecture.
  - Publication: [ANCS '08 Xen][IISWC '09 Xen]
- *CPU and Network Interface Controller (NIC) integration design*
  - Experimented core scheduling techniques using Dell Power Edge 2900 (Intel Xeon X5355 * 8) with dual-port 10GbE NIC.
  - Collaborated to develop a full system cycle accurate simulator based on Simics.
  - Publication: [ANCS '09 EINIC]
- *Hardware solution for Deep Packet Inspection (DPI) on SGI workstation.*
  - Rewrote Linux L7-filter and generated its VHDL counterpart to offload to SGI RASC FPGAs.
  - Evaluated results based on FPGA performance and speed up in comparison to general purpose processors.
- Intel IXA Network Processor.
  - Port-mapped Mibench in ASCII C to MicroC, and evaluated the embedded application performance on IXA Workbench.

Guest Lecturer and Teaching Assistant Sept. 2005 - Aug. 2007

- CS 213 Parallel Processing (Graduate level compulsory course)
  - Lectured on multiprogramming, memory management, NUMA architecture, multicore scheduling.
  - Designed, consulted and tutored for class projects using FPGA/CPU/GPU platforms.
- CS 12 (Head TA) Data structures in C++
  - Jobs included lecture and supervision of lab, making up finals, grading and maintenance of course website.
  - Student evaluation score: 6.9/7.0

Beijing University of Technology (BJUT)

Research Assistant Dec. 2004 – July 2005

- Led the "Automatic Generation of Computer Animation" project.
  - Designed schema for XML storage.
  - Implemented knowledge-based searching algorithm in Java.
  - Presented results with MAYA animation.

PUBLICATIONS

- **[TON]** **Danhua Guo,** Laxmi Bhuyan and Bin Liu, **"**An Efficient Parallelized L7-Filter Design for Multicore Servers**",** to appear in IEEE/ACM Transaction on Networking
- **[ANCS '11]** Jilong Kuang, Laxmi Bhuyan, Haiyong Xie and **Danhua Guo**, "E-AHRW: An Energy-efficient Adaptive Hash Scheduler for Stream Processing on Multi-core Servers", *ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS)*, Brooklyn, NY, 2011
- **[INFOCOM '11]** **Danhua Guo,** Laxmi Bhuyan, "A QoS Aware Multicore Hash Scheduler for Network Applications", *IEEE International Conference on Computer Communications (INFOCOM)*, Shanghai, China, 2011
- **[ANCS '10]** Jilong Kuang, **Danhua Guo**, Laxmi Bhuyan, "Power Optimization for Multimedia Transcoding on Multicore Servers", ACM/IEEE Symposium on Architectures for Networking and Communications Systems (ANCS), La Jolla, CA, 2010
- **[ANCS '09 Solaris]** **Danhua Guo,** Guangdeng Liao, Laxmi Bhuyan, Bin Liu, "An Adaptive Hash-based Multilayer Scheduler for L7-filter on a Highly Threaded Hierarchical Multi-Core Server", *Symposium on Architectures for Networking and Communications Systems* (**ANCS**) 2009.
- **[ANCS '09 EINIC]** Guangdeng Liao, Laxmi Bhuyan, **Danhua Guo**, Steve King, "EINIC: an Architecture for High Bandwidth Network I/O on Multi-Core Processors", *Symposium on Architectures for Networking and Communications Systems* (**ANCS**) 2009.
- **[IISWC '09 Xen]** **Danhua Guo,** Guangdeng Liao, Laxmi Bhuyan, "Performance Characterization and Cache-Aware Core Scheduling in a Virtualized Multi-Core Server under 10GbE", *IEEE International Symposium on Workload Characterization* (**IISWC**) 2009.
- **[ANCS '08 L7]** **Danhua Guo**, Guangdeng Liao, Laxmi Bhuyan, Bin Liu, Jason Ding, "A Scalable Multithreaded L7-filter Design for Multi-Core Server", *Symposium on Architectures for Networking and Communications Systems* (**ANCS**) 2008.
- **[ANCS '08 Xen]** Guangdeng Liao, **Danhua Guo**, Laxmi Bhuyan, Steven King, "Software Techniques to Improve Virtualized I/O Performance on Multi-Core Systems", *Symposium on Architectures for Networking and Communications Systems* (**ANCS**) 2008.

HONORS

- IISWC Student Travel Grant Recipient (2009)
- ANCS Student Travel Grant Recipient (2008, 2009)
- 1st-place Award, Cisco CDO Intern Project Competition (2008)
- Graduate Division Fellowship, UC Riverside (2005 - 2007)
- "SORUN Scholarship" offered by SORUN Enterprise, Japan (Top 0.2% in BJUT) (2002 - 2004)
- First Prize in National English Contest for College Students (2002 - 2004)
- Senior member and consultant in university debate team, BJUT (2003)