

# Vishal Gupta

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## OBJECTIVE

Seeking a challenging summer internship that exposes me to new research directions in the field of operating systems and virtualization. (May-Aug. 2010)

## EDUCATION

### Georgia Institute of Technology, Atlanta, GA

Ph.D., Computer Science

Expected May 2013

### University of North Carolina at Chapel Hill, NC

M.S., Computer Science

May 2008

### Indian Institute of Technology (IIT) Madras, India

B.Tech., Computer Science & Engineering

July 2006

## PROFESSIONAL EXPERIENCE

- **Google**, Mountain View, CA (Internship) Jun-Aug 2009  
As a platforms software engineering intern, worked on runtime optimizations to prevent cache pollution by *non-temporal cache prefetching*. More specifically, I developed a technique for statically modifying a program to not cache data with no temporal locality where memory reuse distance is used as a metric to obtain the locality information.
- **IBM India Research Laboratory (IRL)**, New Delhi, India (Internship) June-July 2008  
Worked with the High Performance Computing group on developing a technique to parallelize a sequential SAT solver named Minisat on Blue-Gene. A master-slave architecture was used for load balancing where both the master and the slaves act and coordinate using a state machine which was designed with a focus on scalability.
- **Yahoo!**, Sunnyvale, CA (Internship) May-Aug 2007  
Developed an API which enables users to categorize data by applying keyword tags and perform a search using these tags. Tagged data can also be shared using public tags. Also, implemented a simple web-based front-end to use this API.
- **Open-Silicon**, Bangalore, India (Internship) May-Jul 2005  
Performed standard cell library characterization for digital gates, latches, and flip-flops using Spice.
- **RISE Lab**, Dept. of CSE, IIT Madras, India (Internship: sponsored by Intel India) June-Aug 2004  
Testing of decoder unit for a behavioral model simulator of Intel x86 core.

## RESEARCH EXPERIENCE

- **Energy Efficiency in Virtualized Asymmetric Multicore Platforms (CERCS Systems Research Group, Georgia Tech)**: Currently working with Dr. Karsten Schwan on investigating techniques to optimize power-performance ratio when running multiple virtualized servers on a heterogeneous multicore platform. I'm looking into both aspects of heterogeneity, performance (single ISA asymmetric cores) and functional (shared non-identical ISA).
- **Energy Conservation in Asynchronous Systems Using Self-Adaptive Fine-Grain Voltage Scaling (M.S. Thesis, UNC Chapel Hill)**: Proposed a new voltage scaling technique for asynchronous systems which allows fine-grain scaling of supply voltage, i.e. each stage in the pipeline is allowed to scale its voltage independently which gives higher energy savings as compared to coarse grain techniques.
- **Delay and Power Minimization in On-Chip Buses using Temporal Redundancy (B.Tech. Thesis, IIT Madras)**: Proposed two novel bus encoding schemes to minimize delay and power consumption in on-chip buses. Unlike the previous techniques which used spatial redundancy (extra lines) for encoding, our technique uses temporal redundancy (multiple transmissions) for reducing crosstalk effects.

## RESEARCH PUBLICATIONS

- “Temporal Redundancy Based Encoding Technique for Peak Power and Delay Reduction of On-Chip Buses” K Najeeb, Vishal Gupta, V. Kamakoti, and Madhu Mutyam  
Journal of Low Power Electronics (JOLPE), December 2006.
- “Performance Estimation and Slack Matching for Pipelined Asynchronous Architectures with Choice” Gennette Gill, Vishal Gupta, and Montek Singh  
IEEE/ACM International Conference on Computer Aided Design (ICCAD), San Jose, CA, Nov. 2008.
- “Delay and Peak-Power Minimization for On-Chip Buses using Temporal Redundancy”  
K Najeeb, Vishal Gupta, V. Kamakoti, and Madhu Mutyam  
ACM Great Lakes Symposium on VLSI (GLSVLSI), Philadelphia, PA, USA, May 2006.
- “Performance Estimation and Slack Matching for Pipelined Asynchronous Architectures with Choice”  
Gennette Gill, Vishal Gupta, and Montek Singh  
International Workshop on Logic & Synthesis (IWLS), Lake Tahoe, CA, USA, June 2008.

## TEACHING EXPERIENCE

- **Distributed Computing:** Teaching assistant at Georgia Tech Aug-Dec 2009
- **Computer & Network Security:** Teaching assistant at UNC Chapel Hill Jan-May 2008
- **Digital Logic Design:** Teaching assistant at UNC Chapel Hill Jan-May 2007

## COURSE PROJECTS

- **Operating System Kernel:** Developed a thin-kernel for a distributed operating system which supports process management, local and distributed interprocess communication, process synchronization, and distributed terminal devices for I/O. Finally, a teleconferencing console was built using this kernel.
- **Superscalar Multi-processor System:** Participated in a 3-member team which developed a superscalar multiprocessor system with MESI protocol for cache coherency and Tomasulo protocol for instruction level parallelism in Verilog HDL and burnt in on FPGA.
- **MapReduce using MPI:** Developed a simplified implementation of Google MapReduce API using MPI. Fault-tolerance was not implemented as part of this implementation.
- **File System:** Implemented a simple file system in Java which could read and write blocks of data to main memory module by issuing I/O system calls to an operating system model which simulated disk behavior. Also, buffer cache system was implemented.
- **Pascal Compiler:** Implemented a simple working compiler front end for the Pascal language in C which converts source program to x86 assembly code which can be assembled using Nasm.

## COMPUTER SKILLS

**Programming:** C, C++, Java, Verilog, Perl, Python, PHP, HTML, XML, SQL, 8086, Shell Script  
**Tools & APIs:** MPI, openMP, OpenGL, GDB, SVN, Makefile, Latex, Gnuplot, MS-DOS, MS Office

## COURSE WORK

- **Graduate:** Operating Systems, Computer Architecture, Distributed Computing, Algorithm Analysis, Computer Networks, High Performance Computing
- **Undergraduate:** Compilers, Database Systems, Software Engineering, Real Time Systems, Artificial Intelligence, Computer Graphics, Graph Theory, Probability & Statistics, Operations Research

## ACADEMIC AWARDS

- Winner of Yahoo! Hack Event for Upcoming HotJobs application. 2007
- IEEE Asian Test Symposium (ATS) fellowship, Kolkata, India. 2005