Neelam Goyal

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Academic Details

- **University of Wisconsin Madison, MS in Computer Sciences – Anticipated in May 2008**

GPA – 4.0/4.0
Courses Done: Advanced Operating Systems, Mobile and Wireless Networking, Advanced Computer Architecture, Topics in Database Management, Advanced topics in Computer Architecture, Introduction to Information Security
Current: Distributed Systems, Advanced Topics in Database Management Systems

- **Birla Institute of Technology & Science, Pilani, India, B.E (Hons.) Computer Sciences, June 2005**

CGPA - 9.81 /10.00, Departmental Ranking - 3

Master's Research

- **Virtualization of Transactional Memory**

Transactional Memory (TM) is a programming construct which promises to make **multi-threaded programming** simpler by removing the need of conventional locks which are hard to program with and easy to deadlock. I am working on **virtualizing TM** to make it tolerate OS events such as **context switching, paging and system calls**. The current focus is to transactionalize commercial server and client workloads such as BIND DNS server, AOLServer, Firefox etc. while handling the system calls encountered inside transactions.

Experience

- **College Intern, Cisco Systems, Inc. San Jose, USA, June 2007 – Aug 2007**

Work Area: Embedded Software for Network Devices (Routers)
Description: Worked on proprietary 7600 series of **Edge Routers** that delivers optical WAN and metropolitan-area network (MAN) functionality with high-touch IP services at the network edge.
- Worked on next generation 40 G metro Ethernet Line Card to scale the number of **VCs** (Virtual Connections) on a VLAN in Layer 2 environment.
- Worked on pseudoport allocation algorithms for **Multi Point Bridge (MPB), Bridge Control Protocol (BCP)** and **Virtual Private LAN Service (VPLS)**.
- Changed inter card communication messages and handlers to scale with new capability of VCs.

- **Software Engineer, STMicroelectronics Pvt Ltd, India**, **July 2005 - July 2006**

Work Area: Embedded Software
Description*:* Worked on STMicroelectronics' **Nomadik®** family of **multimedia application processor** chips aimed at 2.5G/3G mobile phones and other portable wireless products with multimedia capability.
- Development and testing of **Board Support Packages** for Nomadik on **Windows Mobile platform**.
- Dealt with device **boot mechanisms**, in particular made changes to the driver for NAND flash for enabling boot from NAND flash.

- **Co-op, Hewlett Packard Labs, Bangalore, India, Jan 2005 – June 2005**

Work Area: Digital Multimedia Broadcasting
Description: Worked on a HP proprietary system in which simulcasted data is sent over the broadcast channel and at the receiver end this data is used for various informative applications enhancing the TV viewing experience of users by making use of the **Vertical Blanking Interval** of TV systems.

- Worked out data transfer utilities via Bluetooth for transferring supplementary data to potential applications.
- Worked on a software emulator for the decoding the simulcasted data from the mixed signal.

- **Intern, Bhabha Atomic Research Centre, Mumbai, India, May 2003 to July 2003**

Work Area: Image Processing

Description: Worked on Multi-Resolution Analysis and Image Compression using wavelets.

- Implemented an efficient algorithm for construction of **Image Pyramids** and developed software to perform **image compression** and reconstruction by applying **Discrete Wavelet Transformation**.
- Performed a comparative analysis of the effects of using different filters (like **Haar, Debychev** etc.) and specifying different degrees of compression.
- Performed **texture analysis** by applying **wavelet** techniques to texture images.

Projects

- **Towards a Transaction Safe Operating System**

This project attempts to address one of the challenges brought in operating system design by the introduction of **transactional memory** by developing a framework for **transaction safe system calls**. A general paradigm based around the concept of a two phase procedure is proposed and the design is demonstrated by implementing transaction safe versions of two Unix system calls, namely kill and fork.

- **XThru – Cut Through Forwarding**

This project recognizes that the **latency problems in wireless mesh networks** exist due to their operation in **ad-hoc mode** that causes a lot of delay at each node owing to the extensive processing that takes place at each hop. In this work we propose operating the wireless mesh network in **infrastructure mode** and provide practical evaluations to support our proposal.

- **Network Intrusion Prevention/Detection Processing Utilizing GPUs**

The architecture of **Graphical Processing Unit** (GPU) has evolved into a very flexible and powerful computing engine. GPU is very good at **data-parallel processing** with **high computation intensity**. **Network intrusion prevention** systems expose both these characteristics and thus such systems can be optimally executed on GPU. We propose executing **eXtended Finite Automata** (XFA), a newer way of implementing the **signature matching engine**, on GPU to make network processing exploit its benefits.

- **Towards Style Customization in Community Web Portals**

One of the prime features of **DBLife**, a community web portal for database researchers, is superhomepages, which aggregates and presents all detected or inferred information about a given researcher. The current layout of a superhomepage in DBLife is fixed. Motivated by the **importance of user interface and customization of web content**, we attempt to provide a way to **customize superhomepages** in DBLife.

- **Making System Calls Transaction Safe**

We look at Transactional Memory issues related to system calls, with respect to two important server workloads - AOLserver and BIND. Our focus is primarily on file system calls and network send()/recv() calls and their variants. We propose using a cross-layer mechanism which leverages both kernel and user level support to provide an easy and minimum performance overhead solution to handle network calls.

Publications

- Haris Volos, Neelam Goyal, and Michael M. Swift, "**Pathological Interaction of Locks with Transactional Memory",** *3rd ACM SIGPLAN Workshop on Transactional Computing*, February 2008.

- Michael M. Swift, Haris Volos, Neelam Goyal, Luke Yen, Mark D. Hill and David A. Wood, **"OS Support for Virtualizing Hardware Transactional Memory",** *3rd ACM SIGPLAN Workshop on Transactional Computing*, February 2008.
- Neelam Goyal, Justin Ormont, Randy Smith, Karthikeyan Sankaralingam, and Cristian Estan, "**Signature Matching in Network Processing Using SIMD/GPU Architectures**", Technical Report TR1628, Department of Computer Sciences, The University of Wisconsin-Madison, 2008.
- Vaibhav Rajan and Neelam Goyal**, "Distributing ring-tones: A new method using the broadcast infrastructure",** Hewlett-Packard Labs Technical Report, 2005.

Skills

Programming Languages	C, C++, Java, Visual Basic, x86 Assembly, PL/SQL, Verilog HDL
Operating Systems	Windows 98/NT/XP, Linux, Unix, Solaris
CASE Tools	Rational Suits (ClearCase), CVS, SVN
Documentation	Microsoft Office

Awards and Honors

- Birla Institute of Technology and Science, Pilani, Merit Scholarship for four semesters (2001-2003) for being in top 10 of my class (approximately 900 students).
- BSNL Departmental Technical Scholarship for 2 years for good academic performance during undergraduate studies at Birla Institute of Technology and Science, Pilani.
- Stood 7th in the State of Punjab in India in XII Board Examination.