

Sahan Gamage

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RESEARCH INTERESTS	Improving I/O Performance in Virtual Machines, Datacenter Networking and Cloud Computing	
EDUCATION	Purdue University Ph.D. in Computer Science GPA: 4.0 <i>Advisor: Professor Dongyan Xu</i>	August 2013 (expected) West Lafayette, IN
	Purdue University M.S. in Computer Science GPA: 3.9	August 2010 West Lafayette, IN
	University of Moratuwa B.Sc. in Computer Science and Engineering GPA: 3.87 First Class Honors	November 2004 Colombo, Sri Lanka
RESEARCH EXPERIENCE	Lab For Research In Emerging Network and Distributed Services Department of Computer Science, Purdue University http://friends.cs.purdue.edu/	January 2008 - Present West Lafayette, IN
	My work is focused on improving virtual machine (VM) I/O performance, specifically improving networking performance in virtualized environments. We discovered that under VM consolidation, the scheduling of VMs for CPU sharing negatively impacts the performance of VM TCP transport. In recent publications we proposed several mechanisms to avoid this performance penalty incurred due to VM scheduling by offloading certain portions of TCP to the hypervisor layer.	
REFEREED PUBLICATIONS	Opportunistic Flooding to Improve TCP Transmit Performance in Virtualized Clouds Sahan Gamage, Ardalan Kangarlou, Ramana Rao Kompella, and Dongyan Xu ACM Symposium on Cloud Computing (SOCC '11), Cascais, Portugal, Oct 2011 [Paper of Distinction]	
	This project targets on improving TCP transmit performance in virtualized environments. When multiple VMs consolidated on the same core, scheduling latencies affect growth of congestion window of VM's TCP connections and hence the progression of those connections. In this work, we propose an architecture where TCP congestion control is offloaded to hypervisor layer so that VM can flood packets to the hypervisor, alleviating negative effects of VM scheduling.	
	vSnoop: Improving TCP Throughput in Virtualized Environments via Acknowledgment Offload Ardalan Kangarlou, Sahan Gamage, Ramana Rao Kompella, and Dongyan Xu ACM/IEEE Supercomputing 2010 (SC '10), New Orleans, LA, Nov 2010 [Best Student Paper Finalist]	
	In vSnoop project, we offloaded TCP acknowledgement functionality to hypervisor layer. We showed that by acknowledging TCP packets at hypervisor layer (when it is safe to do so) we can improve TCP receive performance of virtual machines and mitigate the VM scheduling effects.	

**OTHER
PUBLICATIONS**

vFlood: Opportunistic Flooding to Improve TCP Transmit Performance in Virtualized Clouds
Sahan Gamage, Ardalan Kangarlou, Ramana Rao Kompella, Dongyan Xu
Poster, 8th USENIX Symposium on Networked Systems Design and Implementation (NSDI '11), Boston, MA, Mar 2011

In-Network Suspend and Resume for GENI Experiments
Ardalan Kangarlou, Sahan Gamage, Dongyan Xu, Pradeep Padala, Bob Lantz, Ulas C. Kozat, Ken Igarashi.
Poster/Demo, 9th GENI Engineering Conference (GEC9), Washington D.C., Nov 2010
(<http://ppadala.net/research/GENI-VIOLIN/>)

Distributed Suspend and Resume for GENI Experiments
Ardalan Kangarlou, Sahan Gamage, Dongyan Xu, Pradeep Padala, Ulas C. Kozat, Ken Igarashi, Bob Lantz
Poster/Demo, 8th GENI Engineering Conference (GEC8), San Diego, CA, Jul 2010.
(<http://ppadala.net/research/GENI-VIOLIN/>)

vSnoop: Improving TCP Throughput in Virtualized Environments via Acknowledgment Offload
Sahan Gamage, Ardalan Kangarlou, Ramana Rao Kompella, Dongyan Xu
Poster, 7th USENIX Symposium on Networked Systems Design and Implementation (NSDI '10), San Jose, CA, April 2010

**PROFESSIONAL
EXPERIENCE**

NEC Laboratories America, Inc. Princeton, NJ, USA May 2011 - Aug 2011
Intern, Autonomic Management Division

CLUE: Analytic engine for transaction systems
CLUE is an analytic engine build to analyze massive and unstructured events generated by modern transaction systems, such as multi-tier web services, to recover transaction traces and mine transaction patterns. CLUE features novel data mining technology for automated information retrieval, and state-of-art management toolset for modern transaction systems. I contributed to this project by helping to understand Linux kernel event traces generated by the NEC proprietary tracing tool and by studying the performance overhead of this tracing system. Also I prototyped tools to filter these traces, generate communication pattern graphs and compare different traces using simple string edit distance algorithms.

Rosen Center for Advanced Computing, Purdue University, USA May 2010 - May 2011
Graduate Assistant

Data management system for NEEShub projects(<http://www.nees.org>)
Network for Earthquake Engineering Simulation hub (NEEShub) is a platform that lets research labs distributed nationally to share data, develop collaborative tools and run earthquake simulations. I worked on developing a data management system in this platform, where data obtained from experiments in various formats such as XML, csv, Mini-SEED can be uploaded and stored in a central repository. This system includes data presentation tools such as tables, maps and various visualization tools.

Analysis tool for data generated from infusion pumps (<http://www.catalyzecare.org/ipi>)
I worked in a team which developed an analysis system for the data generated from "smart" IV infusion pumps that automatically deliver medication to patients. IPI is a user-friendly way for hospitals to access, investigate and share smart pump log data through web portal. The system can be used to visualize, analyze, explore and report on usage, trends, programming practices, interventions, and cross-hospital comparisons for pump-generated alerts and clinical staff resolutions

WSO2 Inc., Colombo, Sri Lanka

November 2005 - August 2006

Senior Software Engineer

Designed and implemented transport layer and threading model for Apache Axis2/C web services engine (<http://axis.apache.org/>)Designed and implemented Apache Sandesha2/C module to provide reliable messaging capabilities to Axis2/C engine (<http://axis.apache.org/axis2/c/sandesha/>)**Millennium Information Technologies, Colombo, Sri Lanka**

October 2004 - November 2005

Software Engineer

Performance improvements of middleware of the MillenniumIT trading platform (now owned by London Stock Exchange)

Designed and implemented reliable multicast support based on bi-modal probabilistic multicast algorithm for this middleware platform.

**TEACHING
EXPERIENCE****Teaching assistant for CS354 (Operating Systems)**

January 2010 - May 2010

Department of Computer Science, Purdue University

West Lafayette, IN

My tasks included teaching labs along with designing and grading projects. I introduced a new project to this course for students to get familiarized with Linux kernel using user mode Linux.

Teaching assistant for CS240 (C Programming)

August 2006 - December 2007

Department of Computer Science, Purdue University

West Lafayette, IN

My duties were guiding students in lab sessions, designing and grading projects.

COURSEWORK

Graduate Courses Completed:

Operating Systems, Cryptography, Algorithm Design, Distributed Programming, Compiling and Programming Systems, Data Communication and Computer Networks, Parallel Computing, Inter-networking, Software Engineering, Computer Architecture

**TECHNICAL
SKILLS****Operating Systems:** Linux (with Xen Virtual Machine Monitor), Windows**Languages and more:** C, PHP, C++, Java, Python, SQL, Shell scripting**Linux kernel programming :** Experience with Linux networking stack, Xen/Linux device driver programming**Development tools:** GNU toolchain, CVS, Subversion**PROFESSIONAL
ACTIVITIES****Student Reviewer**

IEEE International Conference on Autonomic Computing (ICAC '08, ICAC '10), High-Performance Cluster and Grid Computing (VHPC '08), Cluster Computing Journal (Springer), The Third ACM Workshop on Scalable Trusted Computing (ACM STC '08), International Conference on Distributed Computing Systems (ICDCS '09), ACM Symposium on Information, Computer and Communications Security (ASIACCS '10, ASIACCS '11), Workshop on Hot Topics in Cloud Computing (Hot-Cloud '09), IEEE Transactions on Parallel and Distributed Systems (TPDS), The 20th International ACM Symposium on High-Performance Parallel and Distributed Computing (HPDC '11), Journal of Internet Services and Applications (JISA) - Special Issue on Cloud Computing,