

H. Andrés Lagar-Cavilla

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EDUCATION

Ph.D. in Computer Science, **University of Toronto**, Canada

January 2005 – August 2009. GPA 4.0/4.0

Advisor: Prof. Eyal de Lara

Thesis: Flexible Computing with Virtual Machines

M.Sc. in Computer Science, **University of Toronto**, Canada

September 2003 – December 2004. GPA 4.0/4.0

Advisor: Prof. Eyal de Lara

Thesis: Robustness of Simplified Simulation Models for Indoor MANET Evaluation.

B.A.Sc. Computer Systems Engineering, **Universidad Nacional del Sur**, Argentina

February 1998 – February 2003

GPA 10/10 – Highest program and university historical GPA

RESEARCH CONTRIBUTIONS

I was the main architect and lead developer of the following projects:

- **SnowFlock** enables stateful cloning of VMs in cloud computing environments. Unlike current practice, cloning a VM to multiple hosts is parallel, scalable, fast (sub-second), with low runtime overhead (5% or less), and with an intuitive API (process fork-like). SnowFlock allows for simple and efficient scaling of cloud applications to perform tasks such as parallel processing in bioinformatics or quantitative finance, or handling bursts like flash crowds. SnowFlock is available at <http://sysweb.cs.toronto.edu/snowflock>
- **Snowbird** implements VM-based application migration to seamlessly relocate applications that alternate between computational and interactive phases, such as scientific, diagnostic and design tools. Snowbird allows unmodified applications to transparently leverage the interactive performance of thick clients and the access to remote resources enabled by thin clients.
- **VMGL** provides 3D hardware acceleration to applications running inside VMs, with a performance that is 86% or better of native. VMGL is virtual machine monitor, OS, and graphics vendor-independent, and has a wide user community spanning over ten thousand Xen, VMware, KVM and VirtualBox users. VMGL is available at <http://sysweb.cs.toronto.edu/vmgl>
- **Ad Hoc Networks**: I showed that the simplified simulation models widely used in the evaluation of ad hoc network routing protocols lack robustness and yield unreliable results when varying simulation conditions.

I was also the co-lead in the following project:

- **Patagonix** is a hypervisor-based security substrate that detects and prevents the execution of stealthy malware even if the OS kernel is compromised.

PUBLICATIONS

Conference

SnowFlock: Rapid Virtual Machine Cloning for Cloud Computing

H. Andrés Lagar-Cavilla, Joseph A. Whitney, Adin Scannell, Stephen M. Rumble, Philip Patchin, Eyal de Lara, Michael Brudno and M. Satyanarayanan

Best paper award in **Eurosys 2009**: European Conference in Computer Systems. Acceptance rate: 17%

Hypervisor Support for Identifying Covertly Executing Binaries

Lionel Litty, H. Andrés Lagar-Cavilla and David Lie

Usenix Security 2008. Acceptance rate: 16%

Interactive Resource-Intensive Applications Made Easy

H. Andrés Lagar-Cavilla, Niraj Tolia, Eyal de Lara, M. Satyanarayanan and David O'Hallaron

Middleware 2007: ACM/IFIP/USENIX International Middleware Conference. Acceptance rate: 20%

VMM-Independent Graphics Acceleration

H. Andrés Lagar-Cavilla, Niraj Tolia, Eyal de Lara and M. Satyanarayanan

VEE 2007: Virtual Execution Environments. Acceptance rate: 26%

Simplified Simulation Models for Indoor MANET Evaluation Are Not Robust

H. Andrés Lagar-Cavilla, Gerard Baron, Tom Hart, Lionel Litty and Eyal de Lara

SECON 2004: Sensor and Ad Hoc Communications and Networks. Acceptance rate: 18%

Hermes: Fine Granularity Software DSM

H. Andrés Lagar-Cavilla and Rafael B. García

CACIC 2003: IX Argentinian Conference on Computer Science, La Plata, Argentina, October 2003.

Journal

On the Robustness of Simple Indoor MANET Simulation Models

H. Andrés Lagar-Cavilla, Gerard Baron, Tom Hart, Lionel Litty and Eyal de Lara,

Ad Hoc & Sensor Wireless Networks, volume 4, number 4, 2007.

To Carry or To Find? Footloose on the Internet With a Zero-Pound Laptop

M. Satyanarayanan, Benjamin Gilbert, Niraj Tolia, H. Andrés Lagar-Cavilla, Ajay Surie, Partho Nath, Adam Wolbach, Matt Toups, Michael A. Kozuch, Casey Helfrich, David O'Hallaron, Adrian Perrig, and David Farber

IEEE Internet Computing, March 2007

Workshop

Computer Meteorology: Monitoring Compute Clouds

Lionel Litty, H. Andrés Lagar-Cavilla, and David Lie

HotOS 2009: Workshop on Hot Topics in Operating Systems

Adding the Easy Button to the Cloud with SnowFlock and MPI

Philip Patchin, H. Andrés Lagar-Cavilla, Eyal de Lara and Michael Brudno

HPC Virt2009: Workshop on System-level Virtualization for High Performance Computing.

Low-Bandwidth VM Migration via Opportunistic Replay

Ajay Surie, H. Andrés Lagar-Cavilla, Eyal de Lara and M. Satyanarayanan

HotMobile 2008: Workshop on Mobile Computing, Systems and Applications. Acceptance rate: 23%

Posters and Work-in-Progress

Five Minutes of Rage with SnowFlock

Work-In-Progress at **OSDI 2008**: Operating Systems Design and Implementation

SnowFlock: VM Cloning for Parallel Cloud Computing

Poster at the **Usenix Annual Technical Conference 2008**

Dimorphic Computing: Sustainable Performance Through Thick and Thin

Poster and Work-In-Progress at **Mobisys 2006**: Mobile Systems, Applications and Services

Invited Talks

SnowFlock: Cloud Computing Made Agile

Systems Design and Implementation, Lectures in Computer Science Seminar, **Intel Research Pittsburgh** and Carnegie Mellon University. Pittsburgh, PA, June 2008.

SnowFlock: Cloud Computing Made Agile

Xen Summit Summer 2008. Boston, MA, June 2008.

Selected as a Xen Summit Highlight.

Snowbird: Interactive Resource-Intensive Applications Made Easy

Systems Design and Implementation, Lectures in Computer Science Seminar, **Carnegie Mellon University**. Pittsburgh, PA, September 2007.

VMGL: VMM-Independent Graphics Acceleration
Xen Summit Spring 2007. Yorktown Heights, NY, April 2007.

Varying Client Thickness for Interactive Scientific Applications
Pittsburgh Supercomputing Center. Pittsburgh, PA, December 2005

HONORS AND AWARDS

Canada Graduate Scholarship, Doctoral
May 2006 – April 2009. Award value: 35K CAD/year
Top scholarship granted by NSERC.

Ontario Graduate Scholarship
Offered on April 2006, declined in favor of NSERC CGS. Award value: 25K CAD/year
Province of Ontario

Google Summer of Code grant
May 2006 – August 2006. Award value: 5K US
Completed a 3D virtualization project under the mentorship of XenSource, Inc.

Wolfond Scholarship in Wireless Information Technology
September 2003 – August 2004. Award value: 25K CAD/year
Computer Science, University of Toronto. Granted to top first-year graduate students

Province of Buenos Aires Award, Argentina
Excellence in Education Award, City Council, Bahía Blanca, Argentina
25 de Mayo Award, Universidad Nacional del Sur, Argentina
Awards granted to the highest graduating GPA of the year 2003 in all disciplines

INTERNSHIP

Visiting Researcher, Carnegie Mellon University

May 2005 – October 2005

Worked with Prof. M. Satyanarayanan's group in topics related to VM migration. Developed the basis for the Snowbird project during my stay.

TEACHING and MENTORING

Teaching Assistant, Department of Computer Science, University of Toronto

September 2003 – Present

- CSC 209: Software Tools and Systems Programming
- CSC 207: Software Design
- CSC 369: Operating Systems
- CSC 258: Computer Organization – Laboratory
- CSC 458: Computer Networks
- CSC 2228: Topics in Mobile and Pervasive Computing (graduate-level class)

Mentor, May 2008 – Present

I supervised two undergraduate students during research scholarships of four and sixteen months respectively.

Tutor, January 2005 – May 2005, Toronto, Canada

I assisted a student with special needs during the course of an undergraduate class.

Teaching Assistant, Computer Science, Universidad Nacional del Sur, Argentina

September 2001 – July 2003

- Computer Organization
- Computer Architecture
- Operating Systems

SERVICE

External Reviewer

- Eurosys 2009, European Conference in Computer Systems
- HotMobile 2009, Workshop on Mobile Computing Systems and Applications
- Ubicomp 2007, Conference on Ubiquitous Computing
- Mobisys 2006, Conference on Mobile Systems, Applications and Services
- Elsevier Ad Hoc Networks Journal, 2006
- Ubicomp 2006, Conference on Ubiquitous Computing

REFERENCES

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