H. Andrés Lagar-Cavilla

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EDUCATION

Ph.D. in Computer Science, **University of Toronto**, Canada
Awarded 2010 NSERC Doctoral Award
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

B.A.Sc. Computer Systems Engineering, **Universidad Nacional del Sur**, Argentina
GPA 10/10 – Highest program and university historical GPA.

PROFESSIONAL

Google Inc – Principal Engineer
May 2014 to Present

- Current: Platform Security lead, and holder of the Incubation Committee seat at OCP for Security. I lead architecture and strategy around Root of Trust, Confidential Compute, CPU vulnerabilities, CPU security and physical security.
- Current: Platform system software lead, with a technical portfolio encompassing system architecture for compute, BIOS, BMC, machine state management, firmware for roots of trust and management controllers. System architect for multi-node and disaggregated systems, as well as Bare Metal-ready platforms.
- Vulnerability mitigation lead, including mitigating Meltdown and Spectre at scale for the whole Google fleet.
- Led memory management, including the Google-wide deployment of software defined far memory through zswap.
- Led the production kernel, including 22 fleet releases in the span of two years, as well as leading a rebase of Google's Linux code base.
- Led memory management for GCE. Architected and deployed GCE's memory efficiency and overcommit infrastructure, in production for six years now.

Gridcentric Inc. – Co-Founder and Chief Scientist
April 2009 to December 2009, and October 2011 to May 2014
I led virtualization development, technical strategy, and our acquisition exit strategy. As a founder I had both a hands-on role in our VMS technology and hypervisor ports, including Xen and KVM, as well as roles in customer account generation and management, business strategy, and business and corporate development.

AT&T Labs Research -- Senior Member of Technical Staff
January 2010 – October 2011
Industrial research lab with a focus on networking and computer systems.

Visiting Researcher, Carnegie Mellon University
May 2005 – October 2005
Worked with Prof. M. Satyanarayanan's group in topics related to VM migration.

University of Toronto – Teaching Assistant
See **Teaching** section.

Universidad Nacional del Sur, Argentina – Teaching Assistant
See **Teaching** section.

PUBLICATIONS

Conference

Software-Defined Far Memory in Warehouse-Scale Computers
H. Andrés Lagar-Cavilla, Junwhan Ahn, Suleiman Souhlal, Neha Agarwal, R Burny, Shakeel Butt, Jichuan Chang, A Chaugule, N Deng, J Shahid, Greg Thelen, Kamil Adam Yurtsever, Yu Zhao, and Parthasarathy Ranganathan
ASPLOS 2019: Architectural Support for Programming Languages and Operating Systems.

vTube: Efficient Streaming of Virtual Appliances Over Last-mile Networks
Yoshihisa Abe, Roxana Geambasu, Kaustubh Joshi, H. Andrés Lagar-Cavilla, M. Satyanarayanan
SOCC 2013: Symposium on Cloud Computing.

Self-Service Cloud Computing
Shakeel Butt, H. Andrés Lagar-Cavilla, Abhinav Srivastava, and Vinod Ganapathy
CCS 2012: Conference on Computer and Communications Security. Acceptance rate: 19%

Jettison: Efficient Idle Desktop Consolidation with Partial VM Migration
Nilton Bila, Eya de Lara, Kaustubh Joshi, H. Andrés Lagar-Cavilla, Matti Hiltunen and M. Satyanarayanan
Eurosys 2012: ACM European Conference in Computer Systems. Acceptance rate: 15%

PipeCloud: Using Causality to Overcome Speed-of-Light Delays in Cloud-Based Disaster Recovery
Timothy Wood, H. Andrés Lagar-Cavilla, K. K. Ramakrishnan, Prashant Shenoy, and Jacobus van der Merwe
SOCC 2011: Symposium on Cloud Computing. Acceptance rate 17%

Energy/Security Tradeoffs in Host-Based Mobile Malware Detection
Jeffrey Bickford, H. Andrés Lagar-Cavilla, Alexander Varshavsky, Vinod Ganapathy, and Liviu Iftode
Mobisys 2011:Conference on Mobile Systems, Applications, and Services. Acceptance rate 18%

Kaleidoscope: Cloud Micro-Elasticity via VM State Coloring
Roy Bryant, A Tumanov, O Irzak, A Scannell, K Joshi, M Hiltunen, H. Andrés Lagar-Cavilla, and Eyal de Lara
Eurosys 2011: ACM European Conference in Computer Systems. Acceptance rate: 15%

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**: ACM 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%.

Journal

SnowFlock: Virtual Machine Cloning as a First Class Cloud Primitive
H. Andrés Lagar-Cavilla, Joseph. A. Whitney, Roy Bryant, Philip Patchin, Michael Brudno, Eyal de Lara, Stephen M. Rumble, M. Satyanarayanan and Adin Scannell
ACM Transactions in Computer Systems. February 2011, volume 29, issue 1.

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.

Pervasive Personal Computing in an Internet Suspend/Resume System
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

Traffic Backfilling: Subsidizing Lunch for Delay-Tolerant Applications in UMTS Networks
H. Andrés Lagar-Cavilla, Kaustubh Joshi, Alexander Varshavsky, Jeffrey Bickford, and Darwin Parra
Mobiheld 2011: Workshop on Networking, Systems, and Applications on Mobile Handhelds.

The Case for Energy-Oriented Partial Desktop Migration
Nilton Bila, Eyal de Lara, Matti Hiltunen, Kaustubh Joshi, H. Andrés Lagar-Cavilla, and M. Satyanarayanan
Hot Cloud 2010: Workshop on Hot Topics in Cloud Computing

Towards a Ubiquitous Cloud Computing Infrastructure
Jacobus van der Merwe, K.K. Ramakrishnan, Michael Fairchild, Ashley Flavel, Joe Houle, H. Andrés Lagar-Cavilla and John Mulligan
LANMAN 2010: Workshop on Local and Metropolitan Area Networks

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%

Book Chapters

The Architecture of Open Source Applications
Chapter “SnowFlock”, Roy Bryant and H. Andrés Lagar-Cavilla. Amy Brown and Greg Wilson (editors)
Lulu.com, 2011, 978-1-257-63801-7 http://www.aosabook.org/en/index.html

HONORS AND AWARDS

Inventor of the Year Award
May 2012. University of Toronto
Granted to professors and students who have successfully commercialized an academic innovation.

NSERC Doctoral Prize
May 2010. Award Value: 10K CAD
Granted yearly to two recipients among all Canadian PhD graduates in all engineering disciplines.

Best Paper Award – Eurosys 2009
Eurosys is ranked 11th by CiteSeer in terms of impact factor across all disciplines in computer science. The paper was unanimously chosen among over 150 submissions and 25 acceptances.

Canada Graduate Scholarship – Doctoral
May 2006 – April 2009. Award value: 35K CAD/year
Top scholarship granted by NSERC. Awarded to 2% of all applicants.

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

Wolfond Scholarship in Wireless Information Technology
September 2003 – August 2004. Computer Science, University of Toronto. Award value: 25K CAD/year

Province of Buenos Aires Award, Argentina
Award granted to the highest graduating GPA of the year 2003 in all disciplines in the province

Excellence in Education Award, City Council, Bahía Blanca, Argentina
Award granted to the highest graduating GPA of the year 2003 in all disciplines in the city

25 de Mayo Award, Universidad Nacional del Sur, Argentina
Award granted to the highest graduating GPA of the year 2003 in all disciplines in the university

PATENTS

- Logging pages accessed from I/O devices, US Patent Number 11151055.
- Method and system for memory oversubscription for virtual machines, US Patent Number 10540092.
- Pipelined data replication for disaster recovery, US Patent Number 10152398.
- Method and system for memory oversubscription for virtual machines, US Patent Number 9501224.
- Tagging a copy of memory of a virtual machine with information for fetching of relevant portions of the memory, US Patent Number 9250969.
- Method and system for workload distributing and processing across a network of replicated virtual machines, US Patent Number 8656387.
- Transmitting delay-tolerant data with other network traffic, US Patent Number 8611213.
- Remote-assisted malware detection, US Patent Number 8584242.
- Balancing malware rootkit detection with power consumption on mobile devices, US Patent Number 8566935.

TEACHING and MENTORING

Mentor, AT&T Labs Research
May 2010 – October 2011
Mentor to graduate interns Jeffrey Bickford, Yoshihisa Abe and Shakeel Butt.

Teaching Assistant, Department of Computer Science, University of Toronto
September 2003 – August 2009

- CSC 209: Software Tools and Systems Programming
- 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, Department of Computer Science, University of Toronto.
May 2008 – August 2009
Supervised two undergraduate students during research scholarships of four and twelve months respectively.

SERVICE

OCP Incubation Committee Member

- Security project – since October 2021 to present

Program Committee Member

- CCSW 2013, Cloud Computing Security Workshop

External Reviewer

- Eurosys 2011, European Conference in Computer Systems
- HotMobile 2011, Workshop on Mobile Computing Systems and Applications
- IEEE Pervasive Computing Journal, 2011
- Springer Journal on Distributed Computing, 2010
- ACM Operating Systems Review Journal, 2010
- Grace Hopper Celebration for Women in Computer Science candidate review, 2010
- IEEE Transactions on Parallel and Distributed Systems Journal, 2010
- Eurosys 2009, European Conference in Computer Systems
- HotMobile 2009, Workshop on Mobile Computing Systems and Applications
- Mobisys 2006, Conference on Mobile Systems, Applications and Services
- Elsevier Ad Hoc Networks Journal, 2006
- Ubicomp 2006, Conference on Ubiquitous Computing