

SANTIAGO BOCK

Department of Computer Science
6507 Sennott Square
University of Pittsburgh
Pittsburgh PA, 15260

Tel: (412) 624-8463
Fax: (412) 624-8854
E-mail: sab104@cs.pitt.edu
Web: www.cs.pitt.edu/~sab104

RESEARCH INTERESTS

Computer architecture, dynamic translation and runtime environments, virtual machines, compilers and operating systems.

EDUCATION

Ph.D. Student (2008 – Present), Computer Science, University of Pittsburgh, Pittsburgh, PA.

- Passed preliminary examinations
- GPA: 3.955

B.S. (2000 – 2006), Degrees in Computer Science *and* Computer Engineering, University of the Andes, Bogota, Colombia.

- GPA: 4.57 over 5

AWARDS AND APPOINTMENTS

NSF Student Travel Grant to attend the 2011 IEEE International Symposium on Performance Analysis of Systems and Software, Austin, Texas, April 2011.

Google Travel Scholarship to attend the 2011 Richard Tapia Celebration of Diversity in Computing Conference, San Francisco, California, April 2011.

Best Poster Award at the 10th Annual Computer Science Day, Department of Computer Science, University of Pittsburgh, March 2010.

Summa Cum Laude degrees in Computer Science *and* Computer Engineering, University of the Andes, March 2007.

Graduate Student Researcher (Summer 2009; January 2010 – May 2011; October 2011 – Present), Department of Computer Science, University of Pittsburgh.

Teaching Assistant (September 2008 – April 2010), Department of Computer Science, University of Pittsburgh.

PUBLICATIONS

Miao Zhou, **Santiago Bock**, Alexandre P. Ferreira, Bruce R. Childers, Rami Melhem and Daniel Mossé, “Real-Time Scheduling for Phase Change Memory Systems”, *IEEE International Conference on Embedded Software and Systems*, Changsha, China, November 2011. **Best Paper Award.**

Santiago Bock, Bruce R. Childers, Rami Melhem, Daniel Mossé and Youtao Zhang, “Analyzing the Impact of Useless Write-Backs on the Endurance and Energy Consumption of PCM Main Memory”, *International Symposium on Performance Analysis of Systems and Software*, Austin, Texas, April 2011.

Alexandre P. Ferreira, **Santiago Bock**, Bruce R. Childers, Rami Melhem and Daniel Mossé, “Impact of Process Variation on Endurance Algorithms for Wear-Prone Memories”, *Design Automation and Test in Europe*, Grenoble, France, March 2011.

Alexandre P. Ferreira, Miao Zhou, **Santiago Bock**, Bruce R. Childers, Rami Melhem and Daniel Mossé, “Increasing PCM Main Memory Lifetime”, *Design Automation and Test in Europe*, Dresden, Germany, March 2010.

Mauricio Guerrero Hurtado, **Santiago Bock**, “Implementation of the TinyOS Operating System on a Wireless Sensor Network Node”, *XIV IBERCHIP Workshop*, Puebla, Mexico, February 2008 (poster).

Mauricio Guerrero Hurtado, Nestor Peña Translavina, Jonathan Cardenas Ortiz, **Santiago Bock**, “Porting of the TinyOS Operating System and Implementation of an Encryption Service on a Wireless Sensor Network Node”, *IEEE Colombian Workshop on Circuits and Systems*, Bogota, Colombia, October 2007.

RESEARCH AND ACADEMIC EXPERIENCE

Phase Change Main Memory (Ph.D. research project)

The goal of this ongoing project is to develop architectural techniques that gather and exploit information from different layers of the system (application, runtime environment, operating system, hypervisor and hardware) to improve the performance, power consumption and lifetime of PCM main memory.

Scalability of the Linux Kernel Memory System (class project)

We studied the page reclaiming algorithm of the Linux kernel and identified parts of the code that can potentially hamper performance in systems with high core counts. We modified the kernel to keep per-core LRU lists, reducing lock contention.

Memory Trace Generation (class project)

We developed a Pin-based tool to generate the memory trace of multi-threaded applications running on a multi-core system. The tool accounts for the order in which locks are acquired and released (based on Pthread calls) and simulates configurable cache architectures.

Dynamic Binary Translation (class project)

We developed a communication framework for the Strata dynamic binary translator that allows running threads to send and receive messages with the purpose of coordinating execution in a multi-core system.

ISA Design and Simulation (class project)

We designed a simple stack-based instruction set architecture and used dynamic binary translation to simulate its functional behavior.

Embedded Operating Systems (undergraduate research thesis)

We ported the TinyOS operating system to the CC2431 wireless sensor network platform.

PROFESSIONAL EXPERIENCE

Research Intern (Summer 2011), Intel, Santa Clara, CA

- Developed a simulation infrastructure to perform characterization studies for dynamic binary translation with hardware support

Software Developer and Consultant (February 2007 – June 2008), Software & Consultoría, Bogota, Colombia.

- Maintained and expanded Colombia’s central bank payment system

Software Developer (June – July 2006), VC Soft, Bogota, Colombia.

- Developed web pages for an enterprise resource planning application

TECHNICAL SKILLS

- Programming Languages: C, C++, Java, MIPS and x86 assembly, SQL, PL/SQL, C#, Perl
- Tools: Simics, Pin, Strata, SimpleScalar, MatLab, TinyOS, Pthreads library