

Jennifer B. Sartor

<http://soft.vub.ac.be/~jsartor/index.html>

Professor Vrije Universiteit Brussel
SOFT, Vrije Universiteit Brussel
Pleinlaan 2
B-1050 Brussels, Belgium
jsartor@soft.vub.ac.be

Researcher Ghent University
ELIS, Ghent University
Technologiepark 15
B-9052 Gent, Belgium
jennifer.sartor@ugent.be

Research Managed runtime environments, memory management, dynamic optimization, software-hardware interaction, memory system efficiency

Education **The University of Texas at Austin** Austin, TX, USA
Ph.D. in Computer Science August 2010
Advisors: Prof. Kathryn McKinley, Prof. Steve Blackburn (from Australian National University)
Title: Exploiting Language Abstraction to Optimize Memory Efficiency

M.S. in Computer Science December 2004
Computer Science Education study August 2002 - December 2003

The University of Arizona Tucson, AZ, USA
B.S. in honors Computer Science and Mathematics, minor in Spanish December 2001

Publications S. Akram, J.B. Sartor, K.S. McKinley and L. Eeckhout. **Write-Rationing Garbage Collection for Hybrid Memories**. *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*, pages 62-77, Philadelphia, PA, USA, June 2018.

S. Akram, K.S. McKinley, J.B. Sartor, and L. Eeckhout. **Managing Hybrid Memories by Predicting Object Write Intensity**. *Programming Across the System Stack (PASS) Workshop at <Programming >2018*. , pages 75–80, Nice, France, April 2018.

M. Saey, J. De Koster, J.B. Sartor, and W. De Meuter. **An Extensible Virtual Machine Design for the Execution of High-level Languages on Tagged-token Dataflow Machines**. *More VMs Workshop*, Brussels, Belgium, April 2017. [Presentation only.]

J.B. Sartor, K. Du Bois, S. Eyerma, and L. Eeckhout. **Analyzing the Scalability of Managed Language Applications with Speedup Stacks**. *IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, California, USA, April 2017.

S. Akram, J.B. Sartor, and L. Eeckhout. **DEP+BURST: Online DVFS Performance Prediction for Energy-Efficient Managed Language Execution**. *IEEE Transactions on Computers*, Vol. 66, Issue 4, pages 601-615, April 2017.

C. González-Álvarez, J.B. Sartor, C. Álvarez, D. Jiménez-González, and L. Eeckhout. **MInGLE: An Efficient Framework for Domain Acceleration using Low-Power Specialized Functional Units**. *ACM Transactions on Architecture and Code Optimization (TACO)*, Vol. 13, Issue 2. June 2016.

S. Akram, J.B. Sartor, and L. Eeckhout. **DVFS Performance Prediction for Managed Multithreaded Applications**. *IEEE Symposium on Performance Analysis of Systems and Software (ISPASS)*, Uppsala, Sweden, April 2016.
—Nominated for **ISPASS's Best Paper Award**.

S. Akram, J.B. Sartor, K. Van Craeynest, W. Heirman, and L. Eeckhout. **Boosting the Priority of Garbage: Scheduling Collection on Heterogeneous Multicore Processors**. *ACM Transactions on Architecture and Code Optimization (TACO)*, Vol. 13, Issue 1, April 2016.

M. De Wael, S. Marr, J. De Koster, J.B. Sartor, and W. De Meuter. **Just-in-Time Data Structures**. *Onward! 2015 as part of Conference on Systems, Programming, Languages and Applications: Software for Humanity (SPLASH)*, p. 61–75, Pittsburgh, October 2015.

*Publications
cont.*

C. González-Álvarez, J.B. Sartor, C. Álvarez, D. Jiménez-González, and L. Eeckhout. **Automatic Design of Domain-Specific Instructions for Low-Power Processors.** *International Conference on Application-specific Systems, Architectures and Processors (ASAP)*, p. 1–8, Toronto, Canada, July 2015. —Won **Best Student Paper Award**.

J.B. Sartor, W. Heirman, S.M. Blackburn, L. Eeckhout, and K.S. McKinley. **Cooperative Cache Scrubbing.** *International Conference on Parallel Architectures and Compilation Techniques. (PACT)*, p. 15–26, Edmonton, Alberta, Canada, August 2014. Acceptance Rate = 26%.
—Nominated for **PACT’s Best Paper Award**.

C. González-Álvarez, J.B. Sartor, C. Álvarez, D. Jiménez-González, and L. Eeckhout. **Accelerating an Application Domain with Specialized Functional Units.** *ACM Transactions on Architecture and Code Optimization (TACO)*, Vol 10, No 4, January 2014.

K. Du Bois, J.B. Sartor, S. Eyerma, and L. Eeckhout. **Bottle Graphs: Visualizing Scalability Bottlenecks in Multi-Threaded Applications.** *ACM SIGPLAN 2013 Conference on Object Oriented Programming, Systems, Languages and Applications (OOPSLA)*, p. 355–372, Indianapolis, Indiana, October 2013. Acceptance Rate = 26%.

K. Du Bois, S. Eyerma, J.B. Sartor, and L. Eeckhout. **Criticality Stacks: Identifying Critical Threads in Parallel Programs using Synchronization Behavior.** *International Symposium on Computer Architecture (ISCA)*, p. 511–522, Tel-Aviv, Israel, June 2013. Acceptance Rate = 19%.
—Received **HiPEAC Paper Award**.

J.B. Sartor, and L. Eeckhout. **Exploring Multi-Threaded Java Application Performance on Multicore Hardware.** *ACM SIGPLAN 2012 Conference on Object Oriented Programming, Systems, Languages and Applications (OOPSLA)*, pp. 281–296, Tucson, Arizona, October 2012. Acceptance Rate = 25%.

X. Yang, S.M Blackburn, D. Frampton, J.B. Sartor, and K.S. McKinley. **Why Nothing Matters: The Impact of Zeroing.** *ACM SIGPLAN 2011 Conference on Object Oriented Programming, Systems, Languages and Applications (OOPSLA)*, pp. 307–324, Portland, Oregon, October 2011. Acceptance Rate = 37%.

J.B. Sartor, S.M. Blackburn, D. Frampton, M. Hirzel, and K.S. McKinley. **Z-Rays: Divide Arrays and Conquer Speed and Flexibility.** *ACM SIGPLAN Conference on Programming Language Design and Implementation (PLDI)*, pp. 471–482, Toronto, Canada, June 2010. Acceptance Rate = 20%.

J.B. Sartor, M. Hirzel, and K.S. McKinley. **No Bit Left Behind: The Limits of Heap Data Compression.** In *The 2008 International Symposium on Memory Management (ISMM)*, pp. 111–120, Tucson, Arizona, June 2008.
—Received conference’s **Best Presentation Award**.

Honors

Nominated for ISPASS’s Best Paper Award for *DVFS Performance Prediction* paper. April 2016

Awarded a research project grant for 2 new PhD students by FWO (Flanders Research Fund) (13% acceptance rate). November 2015

Won ASAP’s Best Student Paper Award for *Automatic Design* paper. July 2015

Awarded inter-university VUB-UGent Alliance. June 2015

Nominated for PACT’s Best Paper Award for *Cooperative Cache Scrubbing* paper. June 2014

HiPEAC Paper Award for *Criticality Stacks* paper. June 2013

First place in poster and presentation rounds in the graduate student category of ACM Student Research Competition at PLDI conference. June 2009

Best student presentation at ISMM conference for *No Bit Left Behind* paper. June 2008

USA’s National Science Foundation graduate student award for East Asia and Pacific Summer Institute, research collaboration with Australian National University. Summer 2008

University of Texas at Austin Computer Science Teaching Assistant Excellence Award. Fall 2003

Experience

Vrije Universiteit Brussel - Software Languages Lab

Assistant Professor

Brussels, Belgium

started September 2014

Research on implementation technology, or how modern programming languages, especially those that run on top of a virtual machine or runtime environment, can be efficiently implemented in terms of performance and memory. Specifically specializing on the optimization of parallel programs running on multicore hardware.

—**Supervision** of 2 PhD, 3 Masters and 1 Bachelors student, and service on doctoral committees.

Ghent University - Computer Systems Lab

Post-doctoral Researcher with Prof. Lieven Eeckhout

Ghent, Belgium

October 2011-September 2016, March 2018

Research on managed language runtime environments running on top of modern, multicore hardware. Explored software-hardware cooperative solutions to utilize and manage memory and processor resources more efficiently from applications, through system software, to cores, caches, and down to DRAM.

—**Supervision** of 5 PhD students and 2 Masters students, and service on doctoral committees.

École Polytechnique Fédérale de Lausanne - Parallel Systems Architecture Lab

Lausanne, Switzerland

Post-doctoral Researcher with Prof. Babak Falsafi

October 2010 - October 2011

Helped with research on light-weight hardware to accelerate instruction-grain runtime monitoring of software to find bugs and security exploits. Also brought up a database workload in Simics.

—**Supervision** of 1 PhD student.

UTexas Computer Science - Programming Languages/Compilers Group

Graduate Research Assistant with Prof. Kathryn McKinley

Austin, TX, USA

January 2004 - October 2010

Research on improving performance with dynamic optimizations in a Java virtual machine, focusing on memory management, developed primarily in Jikes RVM. Changed the heap to have a discontinuous array layout with indirection to fixed-sized *arraylets*, dynamically compressing arraylets to save space and improve memory efficiency. Also explored communicating between virtual machine and caches to save bandwidth, traffic, and cache pollution.

IBM TJ Watson - Dynamic Optimization Group

Research Intern

Hawthorne, NY, USA

June 2007 - December 2007

Optimized page faults in memory-constrained environments through cooperation of the garbage collector and operating system by changing how the collector traverses and organizes objects.

Intel - Managed Runtime Division

Research Intern

Hillsboro, OR, USA

June 2005 - December 2005

Made a Java virtual machine cache-coherent non-uniform memory access (cc-NUMA) aware with dynamic profile-guided object migration. Used hardware performance monitors to inform migration of objects between threads with the garbage collector.

Sun Microsystems - Directory Server Group

Intern

Austin, TX, USA

Summer 2003

Developed a system management prototype web application using Jato and Lockhart framework that was able to install and manage server software.

Teaching

Vrije Universiteit Brussel CS - Performance Analysis and Evaluation

Assistant Professor

Brussels, Belgium

Fall 2016, 2017, 2018

Created and am teaching a course on how to evaluate and analyze performance at all layers of the software/system stack, including the compiler, the managed language runtime environment, the operating system, the processor, and the memory subsystem.

Vrije Universiteit Brussel Computer Science- Multicore Programming

Assistant Professor

Brussels, Belgium

Spring 2015, 2016, 2017, 2018

Teaching a course on multicore programming to masters students, including the concepts of parallelism and concurrency, in the context of three different programming languages: Erlang, Clojure, and Java.

De Hogeschool West-Vlaanderen Industriële Wetenschappen - C++ Computer Programming

Lecturer

Kortrijk, Belgium

Fall 2012, 2013, 2014

Organized and taught 18 hours of C++ to masters students as an introduction to the graphics programming course, including weekly programming assignments, labs with exercises, and a final exam.

<i>Teaching cont.</i>	UTexas Computer Science - Introduction to Computer Programming: C++ TX, USA <i>Assistant Instructor</i> Fall 2009, Spring 2010
	Designed a course to introduce the C++ language to students who had prior programming experience in other languages. Taught the details of C++ in class, including weekly programming assignments and quizzes.
	UTexas Computer Science - Honors Computer Organization Austin, TX, USA <i>Graduate Teaching Assistant with Prof. Steve Keckler</i> Spring 2004
	Assisted the professor, by leading a separate weekly lab, in teaching the basic building blocks of computer systems, including high-level understanding of the compiler, operating system, assembler, instruction set, and hardware.
	UTexas Computer Science - Honors Computer Architecture Austin, TX, USA <i>Graduate Teaching Assistant with Prof. Steve Keckler</i> Fall 2003
Assisted the professor in teaching computer architecture fundamentals: assembly language programming, hardware performance analysis, instruction set design, datapaths, pipelining, and memory systems including caches and virtual memory. —Received annual Teaching Assistant Excellence Award from Computer Science department.	
UTexas Computer Science - Computer Fluency Austin, TX, USA <i>Graduate Teaching Assistant with Dr. Roger Priebe</i> Spring 2003	
Assisted the professor in teaching high-level “what are computers” class for non-majors, in a cooperative learning style. This included computer organization, number representation and storage, algorithms, programming languages, and networking.	
UTexas Computer Science - Elements of Computing and Programming Austin, TX, USA <i>Graduate Teaching Assistant with Dr. Rober Priebe</i> Fall 2002	
Lead a separate weekly lab to assist in teaching introductory programming to Java, including object-orientation, variables and data types, classes, control structures, loops, methods, and arrays.	
UArizona Computer Science - Various Java programming and math classes AZ, USA <i>Section Leader or Undergraduate Teaching Assistant</i> Spring 1999 - Fall 2001	
Assisted the professors, by leading a separate weekly lab, in teaching courses in introductory Java programming and data structures; object-oriented programming and design including event-driven programming and graphical user interfaces in a large scale software system; and discrete math with focus on algorithm analysis and complexity, data structure analysis, and introductory combinatorics and probability.	
<i>Professional Development</i>	Invited to be the General Chair for VEE 2019 conference. March 2019
	Invited to serve as the CGO 2019’s Proceedings Chair. February 2019
	Invited to be the Student Travel Grant Co-Chair for PACT 2018. October 2018
	Invited to be the Program Committee Chair of ISMM 2018 conference. June 2018
	Invited to be a panelist for the PLDI PL Mentoring Workshop. June 2018
	Invited to serve on the jury of the ACM SRC Grand Finals. Spring 2018
	Invited to be the Publicity Chair of ISPASS 2018 conference. April 2018
	Invited to be Workshop co-Chair of <Programming>2018 conference. April 2018
	Invited to join Steering Group of PAMELA project, a UK EPSRC Programme. June 2017
	Served as the <Programming>2017 conference Companion Editor. 2017
	Organized 2-day workshop for the Alliance between UGent’s PerformanceLab and VUB’s Software Languages Lab. Jan 2017
	Invited to be SPLASH 2017 Student Research Competition (SRC) co-Chair. 2017
	Invited to be Poster and Student Research Competition Chair of <Programming>2017 conference. 2017

<i>Professional Development cont.</i>	Served on the jury of a master's student's thesis from Australian National University.	2016
	Invited to teach at Virtual Machines Summer School 2016 in Cumberland Lodge, UK.	May-June 2016
	Served as Chair of CGO's ACM Student Research Competition, and evaluator of Grand Finals.	2015
	Invited to be the Students Chair for CGO.	2015
	Invited to serve on the doctoral committee of Joeri De Koster at Vrije Universiteit Brussel.	Nov 2014
	Invited to present 1-day class on hot IT Trend: The Move to Multicore and Heterogeneous Hardware, at The Hogeschool West-Vlaanderen to Master's students.	April 2014
	Invited to be on ACM SIGPLAN's Programming Languages Software Award committee.	Feb 2014
	Invited to serve on the doctoral committee of Kristof Du Bois at Ghent University.	Feb 2014
	Invited to serve on the doctoral committee of Kenzo Van Craeynest at Ghent University.	April 2013
	Helped Professor Koen De Bosschere edit the HiPEAC Vision Roadmap for 2013, 2015.	2013, 2015
	Selected to participate in MenTa, Ghent University's post-doctoral mentoring program.	Nov 2012
	Accepted by National Science Foundation Advance Program to attend the Negotiating the Ideal Faculty Position Workshop at Rice University.	Sept 2010
	Helped Prof. Maria Jump edit her course packet for "Fundamentals of Programming".	Summer 2010
	Sponsored by CRA-W to attend Grad Cohort Workshop for women.	Spring 2005
	Attended "Tools for Teaching: A Seminar for Experienced TAs" given by The Center for Teaching Effectiveness and The UT Learning Center at UTexas.	Jan 2003
	Attended "New Beginnings: A Seminar for New TAs" given by The Center for Teaching Effectiveness and The UT Learning Center at UTexas.	Sept 2002
<i>Program Committees and Manuscript Reviewing</i>	ICS (ACM International Conference on Supercomputing) External Review Committee (ERC)	2017
	TOPLAS (Transactions on Programming Languages and Systems) journal manuscript review	2016, 2018
	VMIL (Virtual Machines and Intermediate Language) Workshop	2016, 2017
	TOSEM (ACM Transactions on Software Engineering and Methodology) manuscript review	2016
	Micro (International Symposium on Microarchitecture)	ERC 2016
	ICPP (International Conference on Parallel Programming), Prog. Models and Languages	2016
	ECOOP (European Conference on Object-Oriented Programming)	2016, 2018
	TACO (ACM Transactions on Architecture and Code Optimization) manuscript review	2015, 2016, 2017, 2018
	PLDI (ACM SIGPLAN Conference on Programming Language Design and Implementation)	ERC 2015, ERC 2018, 2019
	ASPLOS (International Conference on Architectural Support for Programming Languages and Operating Systems)	2015, ERC 2018
	HPCA (IEEE Symposium on High Performance Computer Architecture) ERC	2015, 2016, 2017, 2019
	ISCA (International Symposium on Computer Architecture)	ERC 2015

<i>Program</i>	VEE (ACM SIGPLAN/SIGOPS Int'l Conference on Virtual Execution Environment)	2015
<i>Committees</i>	MSPC (ACM SIGPLAN Workshop on Memory Systems Performance and Correctness)	2014
<i>and</i>		
<i>Manuscript</i>	Software: Practice and Experience Journal manuscript review	2014, 2015
<i>Reviewing</i>	PPPJ (International Conference on Principles and Practices of Programming on the Java platform)	2013, 2014
<i>cont.</i>		
	CGO (The International Symposium on Code Generation and Optimization)	2013, 2014, 2015, 2017
	OOPSLA (ACM SIGPLAN Conference on Object Oriented Programming, Systems, Languages and Applications)	2013, ERC 2014, 2017
	ISMM (International Symposium on Memory Management)	2011, 2013, ERC 2014, ERC 2015, ERC 2016, 2017
	Science of Computer Programming Journal manuscript review	2013
	IBM Journal of Research and Development manuscript review	2013
	SPLASH (Systems, Programming, Languages and Applications: Software for Humanity) Doctoral Symposium	2013
	SSPA (International Workshop on Software and System Performance Analytics)	2012
	IISWC (The IEEE International Symposium on Workload Characterization)	2012
	ICOOOLPS (Workshop on Implementation, Compilation, Optimization of Object-Oriented Languages, Programs and Systems)	2011, 2016, 2018
	ISPASS (IEEE Symposium on Performance Analysis of Systems and Software)	2018
	CC (International Conference on Compiler Construction)	2018
	ManLang (International Conference on Managed Languages and Runtimes) - formerly PPPJ	2018
	ToMPECS (ACM Transactions on Modeling and Performance Evaluation of Computing Systems) manuscript review	2017
	PACT (International Conference on Parallel Architectures and Compilation Techniques)	2018
<i>Institutional</i>	Serving on the VUB's computer science bachelor's students thesis committee.	2015-2017
<i>Service</i>	Member of UTexas Women and Minorities in Computer Sciences committee.	Fall 2004 - Spring 2005
	Invited to present session at UTexas Graduate Student Instructor Seminar on "Leading Effective Discussions in Science Classes".	Fall 2004
	Member of UTexas Computer Science Gradfest committee, organizing prospective doctoral student weekend.	Spring 2004
	Member of UTexas Graduate Representative Association of Computer Sciences.	Fall 2003 - Spr 2004
	Member of UArizona Computer Science Undergraduate Curriculum Committee.	Fall 2001
	Co-founder, treasurer, and committee head of UArizona ACM student chapter.	Spr 2001 - Fall 2001
<i>Memberships</i>	Member of Association for Computing Machinery (ACM).	2010-present
<i>of Scientific</i>	DaCapo research group member with yearly meetings.	Jan 2005, 2006, 2007, 2008, April 2009
<i>Societies</i>	Invited to join Upsilon Pi Epsilon, International Honor Society for Computing Sciences.	Fall 2005

- Research Talks* “Cooperative Cache Scrubbing”: UPMC Sorbonne Universités/ LIP6 Inria - invited talk at a Language Runtime Workshop *June 6, 2014*
- “Visualization Tools to Analyze Multi-threaded Program Scalability and Performance”: Technion Israel Institute of Technology *June 24, 2013*
- “The Impact of Zeroing and Z-Rays for Memory Speed and Flexibility”: École Polytechnique Fédérale de Lausanne (EPFL), Ghent University, IBM Zurich *July-September 2011*
- “Exploiting Language Abstraction to Optimize Memory Efficiency”: Inria Rennes, EPFL, University of Lugano, Max Planck Institute for Software Systems, University of British Columbia *May 2010*
- “No Bit Left Behind: The Limits of Heap Data Compression”: University of New South Wales, University of Melbourne, Australian National University *June - July 2008*
- “Object Migration in a cc-NUMA Aware JVM Guided by Dynamic Profiling”: DaCapo group research meeting at The University of New Mexico *January 2006*
- Poster: “Bringing cc-NUMA Awareness to the Java Virtual Machine”: Intel’s Software and Services Group Intern Research Day in Oregon *August 2005*