Emmanuelle SAILLARD
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Research Scientist at Inria STORM Team

Research Interests

High Performance Computing, Debugging, Verification, Optimisation, Static/dynamic Analysis

Research positions

Since 2017 — **Tenured Research Scientist (CRCN)**
Inria Bordeaux (STORM team), France

2016 – 2017 — **Postdoc in parallel computing with Jean-François Méhaut**
Optimisation of kernels with BOAST. European project HPC4E.
Inria Grenoble (CORSE team), France

2015 – 2016 — **Postdoc in parallel computing with Koushik Sen, Costin Iancu and Wim Lavrijsen**
Development of dynamic analyses for speculative communication and synchronization optimizations in large scale scientific codes
University of California Berkeley – Lawrence Berkeley National Lab, Berkeley, USA

Education

2012 – 2015 — **PhD student in parallel computing**
Defended on September 24, 2015 at the University of Bordeaux
Static/dynamic analyses for validation and improvement of multi-models HPC applications launched on hybrid supercomputers with CPUs/GPUs clusters **Mentors:** Denis Barthou and Patrick Carribault
CEA - Université de Bordeaux, France

Ph.D Commitee:
Fabrice RASTELLO (Research Associate First Class, Inria Grenoble, Francee)
Matthias MULLER (Professor in Computer Science, Universit de Aachen, Allemagne)
Emmanuel JEANNOT (Senior Research Scientist, Inria Bordeaux, France)
Denis BARTHOU (Professor, Inria Bordeaux, France)
Patrick CARRIBAULT (Research Engineer, CEA, France)
Torsten HOEFFLER (Assistant Professor, ETH Zurich, Suisse)

2010 – 2012 — **Master degree in computer science, with distinction**, *Université de Versailles, France*
From concepts to systems (COSY), speciality: Modelisation, Optimisation and Decision (MODE)

2008 – 2010 — **Bachelor of science (Mathematics and computer science)**, *Université de Paris Diderot, France*

2006 – 2008 — **Preparatory classes**, *Lycée Saint Charles, Orléans, France*
"Spéciales" : Mathematics and Physics (MP)
"Supérieures" : Mathematics, Physics and industrial science (MPSI)

2006 — **High school diploma in science, with distinction**, *Lycée Duhamel du Monceau, Pithiviers, France*

Internship

Master internship at CEA (France) — April 2012 – August 2012
Static validation of parallel programming models
Tutor: Patrick Carribault

Scientific applications mainly rely on the MPI parallel programming model. But the advent of manycore architectures (larger number of cores and lower amount of memory per core) requires the mixing of MPI with a thread based model like OpenMP. Integrating two different programming models inside the same application can be tricky and generates complex bugs - mostly detected during program execution. During this internship, I developed compile-time analyses integrated in the GNU GCC compiler for applications validation. This internship positively confirmed my decision to continue further the work achieved, this was the object of my thesis.

Intern at Exascale Computing Research Lab (Genci, CEA, Intel, UVSQ) (Versailles, France) — June 2011 – August 2011
Automatic detection of HLS variables
Tutor: Marc Tchiboukdjian and Patrick Carribault

With the decreasing amount of memory available per core in current supercomputers it is important to reduce memory footprint of HPC applications. The MPC (Multiprocessor Computing) framework provides an implementation thread-based of MPI 1.3 standard and allows application developers to share common variables between MPI tasks on the same node. This last extension of MPI is called Hierarchical Local Storage (HLS) and was conjointly developed by CEA and the Exascale Computing Research lab. These three months aimed at finding which variables can be HLS with a post mortem study. The internship was decomposed into two phases. First, I recorded all variables memory access and MPI communications, inserting edges between matching MPI communications to build an acyclic graph that highlight all possible executions paths. Secondly, I developed an analysis based on the acyclic graph to identify variables that can use HLS without additional synchronizations while detecting where to add synchronizations for the others. This was a good introduction to the HPC field.

Publications

Reviewed international conferences

2019 **Multi-Valued Expression Analysis for Collective Checking**
Pierre Huchant, Denis Barthou, Emmanuelle Saillard and Patrick Carribault
In Euro-Par Conference, Lect. Notes in Computer Science, pages 29-43, 2019

2015 **Correctness Analysis of MPI-3 Non-Blocking Communications in PARCOACH**
Julien Jaeger, Emmanuelle Saillard, Patrick Carribault and Denis Barthou, DOI 10.1145/2802658.2802674
In Euro-MPI conference, pages 16:1-16:2, 2015

2015 **MPI Thread-Level Checking for MPI+OpenMP Applications**
Emmanuelle Saillard, Patrick Carribault and Denis Barthou, DOI 10.1007/978-3-662-48096-0_3
In Euro-Par Conference, Lect. Notes in Computer Science, pages 31-42, 2015

2015 **Static/Dynamic Validation of MPI Collective Communications in Multi-Threaded Context**
Emmanuelle Saillard, Patrick Carribault and Denis Barthou, DOI 10.1145/2688500.2688548
In ACM SIGPLAN Symp. on Principles and Practice of Parallel Programming (PPoPP), pages 279-280, 2015. **Poster session**.

2013 **Combining Static and Dynamic Validation of MPI Collective Communications**
Emmanuelle Saillard, Patrick Carribault and Denis Barthou DOI 10.1145/2488551.2488555
In Euro-MPI conference, EuroMPI'13, pages 117-122, 2013.

Workshops

2018 **PARCOACH Extension for a Full-Interprocedural Collectives Verification**
Pierre Huchant, Denis Barthou, Emmanuelle Saillard, Hugo Brunie and Patrick Carribault
Correctness Workshop 2018

2018 **Maximizing Communication Overlap with Dynamic Program Analysis**
Emmanuelle Saillard, Koushik Sen, Wim Lavrijsen, and Costin Iancu DOI 10.1145/3149457.3149459
Proceedings of the International Conference on High Performance Computing in Asia-Pacific Region. HPC Asia, pages 1-11. **Best paper finalist**

2016 **PARCOACH Extension for Hybrid Applications with Interprocedural Analysis**
Emmanuelle Saillard, Hugo Brunie, Patrick Carribault et Denis Barthou, DOI 10.1007/978-3-319-39589-0_11
In Tools for High Performance Computing 2015: Proceedings of the 9th International Workshop on Parallel Tools for High Performance Computing, pages 135-146, 2016. **Invited paper**

2014 **Static Validation of Barriers and Worksharing Constructs in OpenMP Applications**
Emmanuelle Saillard, Patrick Carribault et Denis Barthou DOI 10.1007/978-3-319-11454-5_6
In Luiz DeRose, Bronis R. de Supinski, Stephen L. Olivier, Barbara M. Chapman, and Matthias S. Muller, editors, Proc. Intl. Workshop on OpenMP (IWOMP), volume 8766 of Lect. Notes in Computer Science, pages 73-86, 2014

International journals

2014 **PARCOACH: Combining Static and Dynamic Validation of MPI Collective Communications**
Emmanuelle Saillard, Patrick Carribault et Denis Barthou, DOI 10.1177/1094342014552204
Intl. Journal on High Performance Computing Applications (IJHPCA), 28(4):425-434

Supervision

Internships	Radjasouria Vinayagame (L3 student at ENSEIRB-MATMECA, 1,5 month in 2019-2020)
	Louise MERCIER (High school student, 2 weeks in 2019)
	Firmin Martin (L3 student at ENS Lyon, 1,5 month in 2019)
	Antoine Tirel (M1 student at ENSEIRB-MATMECA, 3 month in 2018)
	Ahmed Amine Nassik (M1 student at Polytech Grenoble, 3 month in 2017)
	Hugo Brunie (M2 student at ENSEIRB-MATMECA, 6 month in 2015)
	Arthur Loussert (M1 student at UVSQ, 2 month in 2014)
PhD	[2019-2022] Tassadit Celia Ait Kaci, co-supervised with Marc Sergent and Denis Barthou
	[2019-2022] Van Man Nguyen, co-supervised with Julien Jaeger, Patrick Carribault and Denis Barthou
Postdoc	[2019-2020] Pierre Huchant (DPEI Inria@SilliconValley), co-supervised with Costin Iancu

Collective Responsibilities

Organizational	**2020:** C3PO Workshop co-Chair, French compilation days Chair
Program Committee	**2020:** SC (Performance)
	2019: Correctness workshop, PPAM, OMASE, 4PAD, Compas
	2018: SC (Workshop), ISC HPC (poster seesion), Compas