

Curriculum Vitae

Francesco Zappa Nardelli

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Personal Details

Name: Francesco Zappa Nardelli
Affiliation: FLaRe, Facebook Research
Present Appointment: Research Scientist
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Education/Qualifications

Oct. 1995 – Oct. 2000 *Laurea* (M.Sc.) in Computer Science, Università di Pisa, Italy.
Oct. 1999 – Sept. 2000 *DEA Programmation* (M.S.), Université Paris Sud, France.
Oct. 2000 – Dec. 2003 *Ph.D.* in Computer Science, *On the Semantics of Higher-Order Processes*, Université Paris 7. Supervised by Giuseppe Castagna. Rewieved by Matthew Hennessy and Davide Sangiorgi and examined by Pierre-Louis Curien, Giuseppe Castagna, Matthew Hennessy, Jean-Jacques Lévy and Glynn Winskel. Viva: December 12th, 2003.
Jan. 2014 *HdR, Reasoning between programming languages and architectures*, ENS. Rewieved by Gilles Barthe, Lars Birkedal and Hans Boehm and examined by Gilles Barthe, Lars Birkedal, Giuseppe Castagna, Andrew Kennedy, Xavier Leroy, Xavier Rival, André Seznec.

Professional History

Dec. 2019 – present Research Scientist, Facebook, France.
Sept. 2015 – present Professeur Chargé de Cours (part-time), École Polytechnique, France.
Oct. 2016 – Nov. 2019 Senior Research Scientist (DR), Inria Paris, France.
Oct. 2004 – Sept. 2016 Junior Research Scientist (CR), Inria Paris, France.
Dec. 2003 – Sept. 2004 INRIA Post-doctoral grant, University of Cambridge, UK.
June 2002 – March 2003 Curie Research Fellow, Sussex University, UK.
Sept. 2000 – Dec. 2003 PhD student, Université Paris 7, France.

Grants

- 2018 Google Research Fellowship Award (*Synthesis of DWARF Unwinding Tables*).
Approx. 50k\$
- 2017-2019 ONR N00014-17-1-2945 (*Vertica: Towards Integrated, Trustworthy, Scripting Languages*).
Subcontractor, approx. 150k\$ (overall 1.5M\$, four partners).
- 2013-2016 Google Europe PhD Fellowship in Operating Systems.
PhD of Robin Morriset, approx. 150k€.
- 2012 – 2015 ANR JCJC WMC (*Weak Memory Concurrency*).
Approx. 204k€. Sole author and investigator.
- 2006 – 2010 ANR-06-SETIN-010 ParSec (*Parallelism and Security*).
Approx. 430k€, four partners. Co-author and responsible for the site of Rocquencourt.
- 2008 – 2011 INRIA Associated Team MM (*Memory Models*).
Approx. 30k€.

Students and Collaborators

- *Graduate Students Advised*. Total Number: 12.
Current PhD Students: Basile Clement (started oct. 2018).
Past PhD Students: Robin Morriset (graduated in April 2017); Nataliya Guts (graduated in January 2011; co-supervised with Jean-Jacques Lévy).
Current Master Student: Sophie Kaleba (started march 2019).
Past Master Student: Jade Alglave, Théophile Bastian, Thomas Braibant, Guillaume Chelfi, Nataliya Guts, Samuel Hym, Kayvan Memarian, Robin Morriset, Remy Oudin, Pankaj Pawan.
- *PostDoctoral Scholars Funded*. Total Number: 4.
Giulio Manzonetto (from 1/1/2009 to 31/12/2009, ANR ParSec), Pejman Attar (from 1/10/2013 to 30/9/2014, ANR JCJC WMC), Thibaut Balabonski (from 1/2/2014 to 30/8/2014, ANR JCJC WMC), Théophile Bastian (from 1/10/2018 to 31/11/2018, ONR Vertica).
- *Collaborators*: Andrew Appel (Princeton University), Sandrine Blazy (INRIA, France), Giuseppe Castagna (CNRS, Université Paris Diderot, France), Albert Cohen (INRIA), Massimo Merro (Università di Verona, Italy), Scott Owens (Kent University, UK), Jaroslav Sevcik (Google, Germany), Peter Sewell (Cambridge University, UK), Viktor Vafeiadis (MPI-SWS, Germany), Jan Vitek (Northeastern University, USA), Glynn Winskel (Cambridge University, UK), Tobias Wrigstad (Uppsala University, Sweden).

Invited Talks

- Workshop on Software Correctness and Reliability, Zurich, 2017.
- Keynote, EuroLLVM international conference, London, UK, 2015.
- Keynote, Test and Proof (TAP) international conference, L'Aquila, Italy, 2015.
- SFM-15: MP summer school, Bertinoro, Italy, 2015.
- Keynote, Journées LLL, Orleans, France, 2013.

- Winter School on Semantics and tools for low-level concurrent programming, Lyon, France, 2013.
- UPMARC Multicore Computing summer school, Stockholm, Sweden, 2011.
- BISS summer school, Bertinoro, Italy, 2005.
- Research Seminars: Dagstuhl; ENS Lyon; IT University, Copenhagen; IMDEA, Madrid; Microsoft Research, Cambridge; Purdue University; Northeastern University; University of Cambridge; Université Paris Diderot; Università di Pisa; Università di Perugia, University of Sussex.

Teaching

- 2015 – present In charge of the *Introduction to computer architectures and operating systems* course at École Polytechnique (France).
- 2013 – 2016 Lectures at École Polytechnique (France) on Introduction to computer science and Concurrent and parallel programming.
- 2011 – present Lectures at the Master Parisien de Recherche en Informatique (MPRI, France) on weak memory concurrency.
- 2009 – 2010 Lectures at the Master Parisien de Recherche en Informatique (MPRI, France) on proof methods for concurrent programs.
- 2006 – 2008 Lectures at the Master Parisien de Recherche en Informatique (MPRI, France) on process languages.
- 2000 – 2003 Monitorat, Université Paris Sud, France.

Synergistic Activities

- PC member of OOPSLA 2019, ECOOP 2017, POPL 2017, ESOP 2015, PPOPP 2015, POPL 2012.
- Reviewer for many international journals, including Theoretical Computer Science, Information & Computation, TOPLAS, Mathematical Structures in Computer Science, and many international conferences, including POPL, LICS, CONCUR, ICFP, ECOOP and FOSSACS.
- PhD thesis examination: Jie Zhao (ENS, jury member), François Ginraud (U. Grenoble, France, jury member), Yannick Zakowski (ENS Rennes, France, jury member), Nhat Minh Le (ENS, France, jury member), Carl Leonardsson (Uppsala University, Sweden, jury member); Eleonora Sibilio (Università di Verona, Italy, reviewer and jury member); Sergueï Lenglet (Université de Grenoble, France, jury member).
- Member of the executive team of the CEA-EDF-INRIA summer schools, 2008 – 2017.

Publications

- [1] B. Chung, F. Zappa Nardelli, J. Vitek. *On Julia Efficient Algorithm for Subtyping Unions and Covariant Tuples*, in ECOOP 2019.
- [2] F. Zappa Nardelli, J. Belyakova, A. Pelenitsyn, B. Chung, J. Bezanson, J. Vitek. *Julia Subtyping: A Rational Reconstruction*, in OOPSLA 2018.
- [3] B. Chung, P. Li, F. Zappa Nardelli, J. Vitek. *A Framework for Object-Oriented Gradual Typing*, in ECOOP, 2018.
- [4] R. Morisset, F. Zappa Nardelli. *Partially redundant fence elimination for x86, ARM, and Power processors*, in CC, 2017.

- [5] R. Morisset, F. Zappa Nardelli. *Partially redundant fence elimination for x86, ARM, and Power processors*, in CC, 2017.
- [6] G. Richards, F. Zappa Nardelli, J. Vitek. *Concrete Types for TypeScript*, in ECOOP, 2015.
- [7] V. Vafeiadis, T. Balabonsky, S. Chakraborty, R. Morisset, F. Zappa Nardelli, *Common compiler optimisations are invalid in the C11 memory model and what we can do about it*, in POPL, 2015.
- [8] G. Richards, C. Hammer, F. Zappa Nardelli, S. Jagannathan, J. Vitek. *Flexible Access Control for Javascript*, in OOPSLA, 2013.
- [9] R. Morisset, P. Pawan, F. Zappa Nardelli. *Compiler testing via a theory of sound optimisations in the C11/C++11 memory model*, in PLDI, 2013.
- [10] N. M. Lê, A. Pop, A. Cohen, F. Zappa Nardelli. *Correct and efficient work-stealing for weak memory models*, in PPOPP, 2013.
- [11] J. Sevcik, V. Vafeiadis, F. Zappa Nardelli, S. Jagannathan, P. Sewell. *CompCertTSO: a verified compiler for relaxed-memory concurrency*, *Journal of ACM*, Vol. 60, No. 3, 2013.
- [12] V. Vafeiadis, F. Zappa Nardelli. *Verifying Fence Elimination Optimisations*, in SAS, 2011.
- [13] J. Sevcik, V. Vafeiadis, F. Zappa Nardelli, S. Jagannathan, P. Sewell. *Relaxed-memory concurrency and verified compilation*, in POPL, 2011.
- [14] S. Owens, P. Böhm, F. Zappa Nardelli, P. Sewell. *Lightweight Tools for Heavyweight Semantics*, in ITP, 2011.
- [15] T. Wrigstad, F. Zappa Nardelli, S. Lebresne, J. Östlund, J. Vitek. *Integrating typed and untyped code in a scripting language*, in POPL, 2010.
- [16] P. Sewell, S. Sarkar, S. Owens, F. Zappa Nardelli, M. Myreen. *x86-TSO: a rigorous and usable programmer's model for x86 multiprocessors*, in *Communications of the ACM*, 53(7), 2010.
- [17] P. Sewell, F. Zappa Nardelli, S. Owens, G. Peskine, T. Ridge, S. Sarkar, R. Strnisa. *Ott: Effective tool support for the working semanticist*, in *Journal of Functional Programming*, 20(1), 2010.
- [18] N. Guts, C. Fournet, F. Zappa Nardelli. *Reliable Evidence: Auditability by Typing*, in ESORICS, 2009.
- [19] S. Sarkar, P. Sewell, F. Zappa Nardelli, S. Owens, T. Ridge, T. Braibant, M. Myreen, J. Alglave. *The semantics of x86-CC multiprocessor machine code*, in POPL, 2009.
- [20] A. Hobor, A. Appel, F. Zappa Nardelli. *Oracle Semantics for Concurrent Separation Logic*, in ESOP, 2008.
- [21] C. Fournet, N. Guts, F. Zappa Nardelli. *A Formal Implementation of Value Commitment*, in ESOP, 2008.
- [22] P. Sewell, F. Zappa Nardelli, S. Owens, G. Peskine, T. Ridge, S. Sarkar, R. Strnisa. *Ott: Effective tool support for the working semanticist*, in ICFP, 2007.
- [23] P. Sewell, J. Leifer, K. Wansbrough, F. Zappa Nardelli, M. Allen-Williams, P. Habouzit, V. Vafeiadis. *Acute: high-level programming language design for distributed computation*, in *Journal of Functional Programming*, 17(4-5), 2007.
- [24] P. Sewell, J. Leifer, K. Wansbrough, F. Zappa Nardelli, M. Allen-Williams, P. Habouzit, V. Vafeiadis. *Acute: high-level programming language design for distributed computation*, in ICFP, 2005.
- [25] G. Castagna, J. Vitek, F. Zappa Nardelli. *The Seal Calculus*, in *Information & Computation*, 201(1), 2005.
- [26] M. Merro, F. Zappa Nardelli. *Behavioural Theory for Mobile Ambients*, in *Journal of ACM*, 52(6), 2005.
- [27] G. Winskel, F. Zappa Nardelli. *new-HOPLA — a Higher-Order Process Language with Name Generation*, in IFIP TCS, 2004.
- [28] M. Merro, F. Zappa Nardelli. *Behavioural Theory for Mobile Ambients*, in IFIP TCS, 2004.

- [29] M. Merro, F. Zappa Nardelli. *Bisimulation Proof Methods for Mobile Ambients*, in ICALP, 2003.
- [30] G. Castagna, F. Zappa Nardelli. *The Seal Calculus Revisited: Contextual Equivalence and Bisimilarity*, in FSTTCS, 2002.
- [31] G. Castagna, G. Ghelli, F. Zappa Nardelli. *Typing Mobility in the Seal Calculus*, in CONCUR, 2001.

Software

- Main author of the "Fast and Reliable DWARF tools", which perform validation and synthesis of the DWARF stack unwinding tables, and speedup DWARF-based unwinding.

This tool performs differential testing to hunt concurrency compiler bugs in C and C++ compilers against the C11/C++11 memory model. The tool is still under development but it already identified several mistaken write introductions and other unexpected behaviours in the latest release of the gcc compiler.

- Main author of the Cmmtest tool (<http://www.di.ens.fr/~zappa/projects/cmmtest>). This tool performs differential testing to hunt concurrency compiler bugs in C and C++ compilers against the C11/C++11 memory model. The tool is still under development but it already identified several mistaken write introductions and other unexpected behaviours in the latest release of the gcc compiler.
- Main author of the Ott system (<http://www.di.ens.fr/~zappa/software/ott>). Ott is a tool for writing definitions of programming languages and calculi. It takes as input a definition of a language syntax and semantics, in a concise and readable ASCII notation that is close to what one would write in informal mathematics. It generates \LaTeX to build a typeset version of the definition, and Coq, HOL, and Isabelle versions of the definition. One of Ott aims is the construction of a common library of frequently used idioms in the programming language community.
- Author of the CompCertTSO verified compiler (<http://www.cl.cam.ac.uk/~pes20/CompCertTSO/>). CompCertTSO is a compiler that generates x86 assembly code from ClightTSO, a large subset of the C programming language enhanced with concurrency primitives for thread management and synchronisation, and with a TSO relaxed memory model based on the x86-TSO model. The development is based on the CompCert compiler from sequential Clight to PowerPC and ARM (developed by Leroy et al., Inria). The CompCertTSO compiler is written mostly within the specification language of the Coq proof assistant, and the correctness of that part has been proved within Coq: for any legal ClightTSO program, any behaviour of the generated code in the x86-TSO semantics is allowed by the ClightTSO semantics of the source program, in the absence of out-of-memory errors.
- Author of the drivers for PCF and BDF font format for the Freetype library (<http://www.freetype.org>). This free-software is included in every Linux distribution and in several proprietary softwares.

Prizes

- *Most Influential ICFP Paper Award* in 2017 for the *Ott: Effective Tool Support for the Working Semanticist* paper published in ICFP'07: <http://www.sigplan.org/Awards/ICFP/>