



# Francesco ZAPPA NARDELLI

Senior Research Scientist (DR), Inria

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<https://fzn.fr>

*My research is at boundaries between programming languages, system programming, and computer architectures, with the overall goal of producing systems which are better-understood, more robust, and more secure.*

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## MAIN RESEARCH PROJECTS

### On Programming Language Design and Implementation

- Reverse engineered and formalised the Julia subtyping relation, relied upon by Julia runtime to implement multiple dispatch. Built a reference implementation of the algorithm, used for differential testing of Julia runtime.
- Designed LikeTypes, a gradual type system for dynamic languages. This design captures common programmer mistakes, is compatible with object-orientation and can be implemented efficiently. It is implemented in the Thorn language and in the StrongScript dialect of JavaScript.

### On Weak Memory Models

- Defined the de-facto standard x86-TSO memory model of the x86 architecture, now relied upon by language standards and mainstream compiler implementations.
- Studied verified compilation for a concurrent dialect of C of top of x86-TSO, building the CompCertTSO verified compiler.
- Studied the correctness of compiler optimisations in the C and C++ memory models. Identified unexpected issues in the C++11 standard, and implemented a tool, cmmtest, to perform random testing of compiler optimizers.

### On Tool Support for Semantics

- Designed and implemented the Ott tool for expressing semantics of large programming language definitions.

### On Debug Information

- Designed and implemented tools to validate and synthesise DWARF unwind tables from binaries, and to speedup ~20x DWARF-based unwinding.

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## EDUCATION

École normale supérieure,  
France, *HdR*, Computer  
Science, 2013

Université Paris 7, France,  
*Ph.D.*, Computer Science, 2003

Università di Pisa, Italy,  
*M.Sc.*, Computer Science, 2000

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## POSITIONS

2016 - present: Senior Research  
Scientist (DR), Inria Paris,  
France

2015 - present: Professeur  
Chargé de Cours (part-time),  
École Polytechnique, France

2004 - 2015: Research Scientist  
(CR), Inria Paris, France

2003: PostDoc, Cambridge  
University, UK

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## PUBLICATIONS

Available online at

<https://fzn.fr/publications.html>

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## LANGUAGES

Italian (mother tongue)

English and French (fluent)

