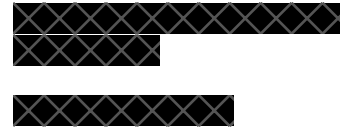




# Francesco ZAPPA NARDELLI

Research Scientist, Meta



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<https://fzn.fr>

## MAIN PROJECTS

### On Programming Language Design and implementation

- Extended Meta's Hack language to make it a better fit for Meta's large framework use cases. Designed and implemented:
  - lightweight dependent types to encapsulate database accesses with uniform typed getters and setters;
  - partial classes to split large classes among multiple files;
  - safe support for trait diamond inheritance;
  - friend modules;
  - fast method call tracing and mocking.
- 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. Initially prototyped on top of JavaScript and V8, it is now supported by Meta's Hack language.
- 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.

### 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 on 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 to perform random testing of compiler optimizers, identifying bugs in gcc.

### 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

2019 - present : Research  
Scientist, Meta

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

2016 - 2019: Senior Research  
Scientist (DR), Inria, France

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

2003: PostDoc, Cambridge  
University, UK

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## RESOURCES

Publications available online at  
<https://fzn.fr/publications.html>

Meta Hack language is at  
<https://hacklang.org>

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## LANGUAGES

Italian (mother tongue)  
English and French (fluent)

