Denis Mazzucato Ph.D.

Compiler Engineer @ AdaCore

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denis-mazzucato

Current Position

MAY 2025 **Compiler Engineer**, AdaCore, Paris (FR)
Working on the GNAT Pro compiler for Ada language.

Education

APRIL 2025 **Postdoc**, *Carnegie Mellon University*, Pittsburgh (US), supervised by Prof. Corina Pasareanu
OCTOBER 2024 *"Proving the Absence of Timing Side Channels in Cryptographic Applications."*

- Verification of the absence of timing side channels in the Assembly *s2n-bignum* library with HOL Light.
- Developed a program analysis tool to detect Hertzbleed side-channel attacks (timing vulnerabilities through frequency scaling) on post-quantum cryptographic algorithms.

DECEMBER 2024 **Ph.D.**, *École Normale Supérieure | PSL & INRIA*, Paris (FR), supervised by Dr. Caterina Urban
OCTOBER 2020 *"Program Analysis by Abstract Interpretation of Quantitative Program Properties."*

- Research in program verification by abstract interpretation for quantitative properties.
- Customized the `interproc` OCaml static analyzer to support a quantitative analysis of C programs.
- Developed the TimeSec tool for certifying cryptographic applications against timing side-channel attacks, combining a syntactical dependency analysis with a semantics-based abstraction.

SEPTEMBER 2020 **Master and Bachelor**, *University of Padua*, Padua (IT), magna cum laude 110/110
OCTOBER 2015 Computer Science, Dipartimento di Matematica, Università degli Studi di Padova.

Professional Experience

2022 **Applied Scientist Intern**, Automated Reasoning Team, Amazon Prime Video, London (UK)
6 MONTHS

- Developed a program analysis tool for backwards reasoning on TypeScript code within promise chains, leveraging TaJS, Z3, and Datalog to enable local reasoning around code assertions.
- Collaborated in a customer-driven environment to ensure production needs and security best practices.

2018 **Quality Assurance Intern**, *THRON*, Padua (IT)
6 MONTHS

- Developed automated testing frameworks for the THRON document management system.
- Engineered a serverless architecture for real-time probe monitoring, deploying the solution on AWS Lambda.

Core Competencies

PASSION Strong curiosity for new programming languages, the compilation trade, and formal verification.
LANGUAGES Fluent in C++, Ada, Python and Haskell; familiar with Go, Rust, OCaml, JavaScript, and Scala.
TOOLING Proficient with Git, GitHub, CI/CD, and knowledge of AWS cloud computing platforms and web3.
RESEARCH Award-winning research and top conference publications in formal methods and security.

Awards & Recognitions

OCTOBER 2024 **Radhia Cousot Award**, for *Young Researcher*, SAS 2024, Pasadena (USA), 3 000€ prize from the ENS foundation for my publication: "Quantitative Static Timing Analysis."

SPRING 2024 **Automated Reasoning Amazon Research Award (ARA)**, *Funding Award*, Amazon, 70 000€ prize
"Proving the Absence of Timing Side Channels in Cryptographic Applications" with Corina Pasareanu.

Selected Projects & Publications

CAV 2025 **Relational Hoare Logic for Realistically Modelled Machine Code**, in collaboration with *Carnegie Mellon University, NASA Ames Research Center, Stanford University, AWS Amazon*
FIRST-AUTHORED PUBLICATION
ICORE: A*
Exploring relational Hoare logic in HOL Light (based in OCaml) for verifying security properties, such as the absence of timing side channels, in the Assembly *s2n-bignum* library within AWS TLS/SSL implementations.

2023 **Summer School on Formal Methods**, Marktoberdorf (DE)
2 WEEKS
Deepened expertise in the scientific foundations and technologies for improving software quality and security.

2020 **Exchange Program**, *Vrije Universiteit*, Amsterdam (NL)
6 MONTHS
Advanced training in Lean and formal methods under the supervision of Prof. Jasmin Blanchette.