

# Abel Nieto

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📄 [abeln.github.io](https://abeln.github.io)

I expect to complete my PhD by July 2023. I am interested in an applied scientist or formal methods engineer position in industry, in the fields of formal verification, programming language design, compilers, type systems, and static analysis. I am affiliated with Aarhus University, but live in Waterloo, Canada.

In addition to research experience in the field of formal methods through my PhD, I have over four years of professional software development experience at e.g. Google (three years full-time) and Meta (one year, internships).

## Education

- January 2020 **PhD (Computer Science)**, *Aarhus University*, Denmark.
  - July 2023 Formal verification of distributed systems using separation logic. Advised by Lars Birkedal.
  - (in progress) Past projects on causal consistency and CRDTs. Current project on robust safety for authorization.
- May 2017– **Master of Mathematics (Computer Science)**, *University of Waterloo*, Canada.
  - Dec 2019 Designed and implemented “explicit nulls”, an extension to Scala’s type system for tracking nullability that was merged into the Scala 3 compiler. Advised by Ondřej Lhoták. Additional work on decidability of the DOT calculus, as well as blame tracking for null interop.
- Sep 2009–Apr **Bachelor of Computer Science**, *University of Waterloo*, Canada.
  - 2014 Major average: 92.53/100. Graduated with Distinction on the Dean’s Honours List.

## Research Internships

- June–Sept **Research Intern**, *Microsoft Research*, Redmond, USA.
  - 2019 Designed and implemented universal and existential types in the CheckedC compiler. Advised by David Tarditi.
- May–Aug **Research Intern**, *MPI-SWS*, Kaiserslautern, Germany.
  - 2018 Static analysis (abstract interpretation) and fuzzing for the Ethereum Virtual Machine. Advised by Maria Christakis.

## Professional Experience

- May **Software Engineer**, *Google*, Kitchener, Canada.
  - 2014–April Google Fiber TV and Technical Infrastructure teams. Android and backend development in Java. Distributed build systems in Go. Promoted from L3 to L4. Managed two interns. Completed interviewer training and conducted 30+ interviews.
- Sep–Dec **Software Engineer Intern**, *Facebook*, Menlo Park, USA.
  - 2013 Implemented immutable containers (e.g. FrozenVector) for Facebook’s HHVM JIT.
- May–Aug **Software Engineer Intern**, *Facebook*, Menlo Park, USA.
  - 2012 Implemented tracking of perf events (e.g. branch misses) for Facebook’s HHVM JIT.

- Sep–Dec **Software Engineer Intern**, *Facebook*, Palo Alto, USA.  
2011 Backend and frontend development in a system for enforcing intellectual property rights.
- Jan–Apr 2011 **Software Engineer Intern**, *BlackBerry*, Waterloo, Canada.  
Embedded development in C for an NFC driver.

## Publications

- OOPSLA'22 **Modular Verification of Op-Based CRDTs in Separation Logic**, *Abel Nieto*, (conditional) *Léon Gondelman, Alban Reynaud, Amin Timany, Lars Birkedal*.
- POPL'21 **Distributed Causal Memory: Modular Specification and Verification in Higher-Order Distributed Separation Logic**, *Léon Gondelman, Simon Oddershede Gregersen, Abel Nieto, Amin Timany, Lars Birkedal*.
- ECOOP'20 **Blame for Null**, *Abel Nieto, Marianna Rapoport, Gregor Richards, Ondřej Lhoták*.
- ECOOP'20 **Scala with Explicit Nulls**, *Abel Nieto, Yaoyu Zhao, Ondřej Lhoták, Angela Chang, Justin Pu*.
- SCALA'17 **Towards Algorithmic Typing for DOT (Short Paper)**, *Abel Nieto*.

## Preprints

- (under submission) **Trillium: Unifying Refinement and Higher-Order Distributed Separation Logic**, *Amin Timany, Simon Oddershede Gregersen, Léo Stefanescu, Léon Gondelman, Abel Nieto, Lars Birkedal*.
- 2018 **Tamarin: Concolic Disequivalence for MIPS**, *Abel Nieto*.

## Skills

- Coq
- Separation logic
- Compiler construction
- Type systems
- Algorithms and data structures design (former competitive programmer)
- SAT and SMT solvers
- Static and dynamic analysis
- Scala/Go/Java/C++/Scheme/OCaml

## Misc

- Jul 2010 **Winner**, *Waterloo Local Programming Contest*.
- 2008 **Silver Medal (44th/300+)**, *XX International Olympiad in Informatics*, Cairo, Egypt.
- 2007 **Participant (187th/300+)**, *XIX International Olympiad in Informatics*, Zagreb, Croatia.