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## Professional Experience

- Oct 2023 – ongoing **Compiler Engineer**, *Groq*, Waterloo, ON (remote).  
Current project: adding support for Pytorch 2.0 in Groq's compiler toolchain.
- Jul 2023 – Oct 2023 **Senior Software Engineer**, *Synopsys*, Waterloo, ON (remote).  
Sigma static analysis engine team. Added support for features in Sigma's Dart frontend. Left Synopsys for Groq in good standing to pursue an interest in deep learning compilers.
- Jan 2020 – Sep 2023 **PhD Fellow**, *Aarhus University*, Aarhus, Denmark.  
Implemented in OCaml and formally-verified in Coq fault-tolerant, highly-available conflict-free replicated data types. Researched novel specification techniques based on separation logic for distributed systems.
- Jun – Sep 2019 **Research Intern**, *Microsoft Research*, Redmond, USA.  
Implemented universal and existential types in the CheckedC compiler, a memory-safe extension to C built using Clang.
- May–Aug 2018 **Research Intern**, *MPI-SWS*, Kaiserslautern, Germany.  
Implemented an abstract-interpretation based static analysis to speed up fuzzing for the Ethereum Virtual Machine.
- May 2017 – Dec 2019 **Graduate Research Assistant**, *University of Waterloo*, Waterloo, Canada.  
Designed and implemented a type system extension in the Scala 3 compiler for ruling out nullability errors at compile time.
- May 2014–April 2017 **Software Engineer**, *Google*, Kitchener, Canada.  
Google Fiber TV team: owner of 2/5 screens in the Android app for Google Fiber TV. Technical Infrastructure team: implemented prototype backend for distributed build system using Merkle trees.
- Sep–Dec 2013 **Software Engineer Intern**, *Facebook*, Menlo Park, USA.  
Implemented a collection of immutable containers (e.g. FrozenVector, FrozenSet, etc.) as part of the runtime of Facebook's PHP JIT compiler.
- May–Aug 2012 **Software Engineer Intern**, *Facebook*, Menlo Park, USA.  
Implemented tracking of perf events (e.g. branch misses) for Facebook's PHP JIT compiler.
- Sep–Dec 2011 **Software Engineer Intern**, *Facebook*, Palo Alto, USA.  
Full-stack development of a contact form for reporting intellectual property rights violations.
- Jan–Apr 2011 **Software Engineer Intern**, *BlackBerry*, Waterloo, Canada.  
Embedded development in C as part of an NFC driver for BlackBerry devices.

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## Education

- Jan 2020 – Sep 2023 **PhD (Computer Science)**, *Aarhus University*, Denmark, Thesis: "Conflict-free Replicated Data Types have Abstract Data Types".
- May 2017 – Dec 2019 **Master of Mathematics (Computer Science)**, *University of Waterloo*, Canada, Thesis: "Scala with Explicit Nulls".
- Sep 2009 – Apr 2014 **Bachelor of Computer Science**, *University of Waterloo*, Canada.  
Major average: 92.53/100. Graduated with Distinction on the Dean's Honours List.

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## Skills

- C++/C/Go/Java/Bash/Scala/OCaml/Scheme/Coq
- Algorithms and data structures design (former competitive programmer)
- Compilers and programming language design and implementation
- Formal verification techniques: fuzzing, static and dynamic analysis, SAT/SMT, separation logic, deductive verification

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## Misc

**Co-authored 5 peer-reviewed publications during masters/PhD.**

2008 **Silver Medal (44th/300+)**, *XX International Olympiad in Informatics*, Cairo, Egypt.

2007 **Participant (187th/300+)**, *XIX International Olympiad in Informatics*, Zagreb, Croatia.