

Experience

- 2021-curr. **The University of Texas** Austin, TX
Graduate Research Assistant, Department of Computer Science
- Researched *lightweight* formal methods, which trade completeness guarantees for practical applicability, to validate the correctness of concurrent and low-level systems software. Applied such techniques in the contexts of verifying the crash consistency of a persistent memory filesystem, and in mechanizing the checking of a modern, optimised Paxos implementation against its hand-written formal specification and proof of correctness.
- 2019-2021 **Independent Consultant** Edmonton, AB, Canada (remote)
Took a break from the corporate world to teach undergraduate computer science, read research papers, and consult on a variety of projects:
- At *Microsoft Research NYC*, contributed to ShapeshifterDB, which uses machine learning and dynamic analysis to optimise datastore index structure. Reduced critical-path policy engine's inference latency by 40%.
 - At *RL Core Technologies*, built reliable and safe systems for reinforcement learning-driven industrial control systems. Implemented property-based testing and record/replay debugging infrastructure for RL agents.
 - At *The University of Alberta Department of Linguistics*, unified offline First Nations language corpora into a open-access database and web frontend. Instructed non-technologists how to maintain and extend the software.
- 2018-2019 **Apple** Cupertino, CA
Systems Software Engineer
- Developed a high-performance GPU emulator modelling then-unreleased SoCs for power-constrained phones, tablets, and wearables. Trading cycle-accuracy for usability, it reproduced functional behaviour with high fidelity and at interactive framerates, allowing software teams to start programming before tapeout. Revived the dormant company-wide OS research paper reading discussion group.
- 2017-2018 **Fauna** San Francisco, CA
Senior Software Engineer
- Developed Fauna's core product, its strongly consistent, distributed document store. Built a greybox fault injection framework and associated DSL to state database correctness conditions, catch consistency violation bugs early, and keep development velocity high. Mentored engineers new to Scala, JVM concurrency, and the strongly-typed FP style.
- 2014-2017 **Fastly** San Francisco, CA
Senior Software Engineer
- Maintained Fastly's core product, an HTTP reverse proxy and cache. Designed and led the implementation of a sandboxing dynamic analysis and system introspection runtime for the Fastly software stack, atop which the compiler, API, and security teams built custom tooling.
- 2012-2014 **Twitter** San Francisco, CA
Software Engineer II
- Extended Twitter's Ruby and Java runtimes on the Runtime Systems team, improving garbage collection, JIT compilation, and analysis tooling. Rebuilt HotSpot's GC logging system to minimise tail latencies exacerbated by blocking I/O. Collaborated with external teams to diagnose service-level performance issues; in one case, careful analysis uncovered a regression throttling throughput by two orders of magnitude. Revamped legacy systems on the Antispam and Trust and Safety Engineering teams, and built new services for spam classification and actioning.

Teaching

For details about my teaching philosophy, please see [my homepage](#).

2020-2021 **MacEwan University**

Edmonton, AB, Canada (remote)

2020-2020 **The University of Toronto**

Toronto, ON, Canada (remote)

Education

2021-2024 **The University of Texas**

Austin, TX

PhD, Computer Science (incomplete) | Supervisor: [James Bornholt](#)

Organised the Systems+PL reading group and mentored undergraduates attending the systems directed reading group.

2009-2012 **The University of British Columbia**

Vancouver, BC, Canada

M.Sc., Computer Science | Supervisor: [Andy Warfield](#)

As President of the CS Graduate Students' Association, liaised with students and UBC, led TA training sessions, organised social activities such as Tuesday Tea and the Undistinguished Lecture Series, and served on the UBC Grad Council. Ran the systems and security reading seminars. Received a TA award for my work supporting CPSC 110.

2005-2009 **The University of Alberta**

Edmonton, AB, Canada

B.Sc. Specialization, Computing Science

As a Undergraduate Association of Computing Science executive, interfaced with groups outside the department and advocated for students' issues within. As a member of the U of A's Cluster Challenge Team, configured and managed the GAMESS quantum chemistry package, and was the team's chemistry domain expert.

Selected Publications and Presentations

09.2024	An Invitation to Liquid Types	Papers We Love NYC Video
07.2024	SquirrelFS: Using the Rust Compiler to Check Filesystem Crash Consistency	OSDI '24 PDF
04.2022	Proving the Coding Interview	Dafny tutorial series Part 1 Part 2 Part 3
05.2018	The Life of a FaunaDB Query	Guest post on the Fauna blog
11.2016	Hands-on HTTP/2, a Fresh Start to The Web	QCon SF
06.2016	Beyond Breakpoints: A Tour Of Dynamic Analysis	QCon NYC Materials
12.2015	Two Approaches Towards OS Scalability	Papers We Love SF Video
09.2015	Racing to Win: Correct Concurrency with Race Conditions	Surge '15 Video
04.2015	Your Computer Is Already A Distributed System; Why Isn't Your OS?	Papers We Love SF Video
06.2014	Your Heap And You: Garbage Collector Tuning for Twitter Services	Internal tech talk
05.2013	Cachekata: Memory Hierarchy Optimization via Dynamic Binary Translation	Msc. Thesis PDF
04.2013	Whose Cacheline is it Anyway: Operating System Support for Live Detection & Repair of False Sharing	Eurosys '13 PDF
03.2012	Debugging Through Time with the Tralfamadore Debugger	RESolve '12 PDF
08.2011	Herbert West: Deanonymizer	HotSec'11 PDF
10.2010	Iodine: Interactive Program Partitioning	OSDI '10 Poster Session