

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, optimized Paxos implementation against its hand-written formal specification and proof of correctness.
- 2020-2020 **Microsoft Research** New York, NY (remote)
Short-term Contract Software Developer
- Contributed to *Shapeshifter* with the AI for Systems lab, which uses machine learning and dynamic analysis to optimize datastore index structure. Through careful design and profiling, reduced the critical-path policy engine's latency by nearly 40%. Built the interactive state visualizer and observability frontend for MSR's TechFest. Mentored incoming PhD interns.
- 2018-2019 **Apple** Cupertino, CA
Systems Software Engineer
- Developed a high-performance GPU emulator modelling then-unreleased System-on-Chips designed for power-constrained phones, tablets, and wearables. Trading cycle-accuracy for usability, it reproduced functional behaviour with high fidelity and at interactive framerates, allowing teams to start programming against the hardware 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. Designed and implemented 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 functional programming style.
- 2014-2017 **Fastly** San Francisco, CA
Senior Software Engineer
- Maintained Fastly's core product, an HTTP reverse proxy and cache, during which network throughput increased sixfold to 4.5 million RPS. Extended Fastly's edge-compute programming language. 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 runtime tooling and infrastructure. Rebuilt HotSpot's GC logging routines to be asynchronous and non-blocking, 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, reducing end-to-end latency by ~10x in one key service, and built new services for spam classification and actioning.

Teaching

For further details about my teaching experience and 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 PhD, Computer Science (incomplete) Supervisor: James Bornholt Organized the Systems+PL reading group and mentored undergraduates attending the systems directed reading group.	Austin, TX
2009-2012	The University of British Columbia M.Sc., Computer Science Supervisor: Andy Warfield As President of the Computer Science Graduate Students' Association, I liaised between grad students and the department, led TA training sessions, organized social activities such as Tuesday Tea and the Undistinguished Lecture Series, and served on the UBC Graduate Council. Organized the systems and security reading seminars for the NSS research lab. Received a TA award for my work supporting CPSC 110.	Vancouver, BC, Canada
2005-2009	The University of Alberta B.Sc. Specialization, Computing Science As a Undergraduate Association of Computing Science executive, I interfaced with groups outside the department and advocated for students' issues within. As a member of the U of A's Cluster Challenge Team, I configured and managed the GAMESS quantum chemistry package, and was the team's physical chemistry domain expert.	Edmonton, AB, Canada

Selected Publications and Presentations

09.2024	An Invitation to Liquid Types	Papers We Love NYC Video Event Page
07.2024	SquirrelFS: Using the Rust Compiler to Check Filesystem Crash Consistency	OSDI '24 PDF
04.2022	Proving the Coding Interview	Dafny verified programming tutorial series Part 1 Part 2 Part 3
01.2020	ELF off the Shelf	Guest lecture in MacEwan University's OS class Slides
05.2018	The Life of a FaunaDB Query	Guest Post on the Fauna Corporate Blog Post
11.2017	Cache Ruins Everything Around Me!	Guest lecture in Macewan University's OS class Slides
07.2017	Let's Build A HyperCard RPG!	Coding Livestream Videos
11.2016	Hands-on HTTP/2, a Fresh Start to The Web	QCon SF 2016 Event Page
06.2016	Beyond Breakpoints: A Tour Of Dynamic Analysis	QCon NYC 2016 Video Materials
12.2015	Two Approaches Towards OS Scalability	Papers We Love SF Video Event Page
09.2015	Racing to Win: Correct Concurrency with Race Conditions	Surge 2015 Video Materials
04.2015	Your Computer Is Already A Distributed System; Why Isn't Your OS?	Papers We Love SF Video Event Page
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