

Nathan Taylor

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Experience

2021-???? The University of Texas

Austin, TX

PhD Student and Graduate Research Assistant | Supervisor: [James Bornholt](#)

Pondered the intersection of formal methods and computer systems. Organized the [PL-Systems](#) reading group and mentored undergrads attending the systems [directed reading program](#). Contributed to the [SquirrelFS](#) Rust persistent memory filesystem.

2019-2020 Microsoft Research

New York, NY (remote)

Contract Software Developer

Contributed to *Shapeshifter* with the [AI for Systems](#) lab, which uses machine learning and dynamic analysis to optimize datastore index structure. Began as an open source contributor as an unemployment hobby, and was subsequently hired by MSR on a short-term contract. Through careful design and profiling, reduced the critical-path policy engine's latency by nearly 40%. Built the interactive [visualizer and frontend](#) for MSR's [TechFest](#). Mentored PhD interns on the project, one of whom reported, "this is the highest-quality research codebase I've ever seen". (I am inclined to agree!)

2018-2019 Apple

Cupertino, CA

Systems Software Engineer

[Brought the rainbow to you](#) by bridging the gap between hardware and software, influencing performance improvements, power efficiency, security, and the programming ease of hitherto-unreleased Apple products.

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. Disseminated knowledge on the [company blog](#).

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 have built custom tooling. Represented Fastly externally by [speaking](#) at [conferences](#).

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 subsystem to be asynchronous and lock-free, to minimise tail latencies exacerbated by blocking writes. 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 Experience

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

2020-2021 MacEwan University

Edmonton, AB, Canada

2020-2020 The University of Toronto

Toronto, ON, Canada (remote)

Education

2009-2012 The University of British Columbia

Vancouver, BC, Canada

Msc, Computer Science | Supervisor: [Andy Warfield](#)

As a TA for UBC's brand-new [Scheme-based introductory CS course](#), I was awarded a [TA award](#) by the University (a [gold star!](#)).

As President of the [CS Grad Students' Association](#), I liaised between grad students and the department, led TA training sessions, organized [social activities](#), and served on the [UBC Graduate Council](#). Organized the [systems](#) and [security](#) reading seminars.

2005-2009 The University of Alberta

Edmonton, AB, Canada

Bsc, 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, benchmarked, and tuned the GAMESS quantum chemistry package, and was the team's physical chemistry domain expert. I also assisted with stereographic visualization of molecular data and general cluster system administration.

Publications and Presentations

- 07.2024 **SquirrelFS: Using the Rust Compiler to Check Filesystem Crash Consistency** | OSDI '24 | [PDF](#) | [Source](#)
- 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](#)
- 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 12/2015 | [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 04/2015 | [Video](#) | [Event Page](#)
- 06.2014 **Your Heap And You: Garbage Collector Tuning for Twitter Services**
- 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