

Nicholas W. Breitling

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EDUCATION

Northwestern University, *Evanston, IL* · 4.0 GPA

Sep. 2024 - Present

- Pursuing Bachelor of Science in Computer Science
- Coursework: Programming Languages, Dynamics of Programming Languages, Proving Properties of Programs with Mechanized Logic, Intro to Type Systems, Data Structures and Algorithms
- Awards and Honors: Tau Beta Pi, Summer Undergraduate Research Grant, High Honors Dean's List

Northeastern University, *Boston, MA* · 4.0 GPA

Sep. 2023 - Apr. 2024

EXPERIENCE

Programming Languages Research Intern, Northwestern Univ., *Evanston, IL*

Jan. 2025 - Present

- Design and conduct a Rational Programmer (RP) experiment to investigate the pragmatics of trace contracts
- Examine the space of strategies for replacing a program's integration tests with trace contracts by encoding those strategies with RP algorithms, implemented in Racket
- Quantify RP performance by measuring the quality of resulting test suites with mutation analysis

Compilers Research Intern, Czech Technical University, *Prague, CZ*

Jan. 2024 - Sep. 2024

- Collaborated on the development of a new infrastructure for just-in-time compilation of R language
- Aided in transition from C++ to Java compile server, focusing on RDS serializer implementation
- Integrated serializer as a communication protocol between C++ frontend and Java backend
- Constructed large-scale integration tests using new communication protocol, comparing server and client-side bytecode to expose numerous inconsistencies

Student Researcher, Minnetonka Research, *Minnetonka, MN*

Sep. 2022 - May 2023

- Developed a new fluid rendering algorithm, utilizing ray-marching as a means of sphere blending
- Created ray-marched and mesh renderers in Vulkan, finding that ray-marching performed best in all benchmarks
- Awarded blue ribbon, purple ribbon, and Stockholm Junior Water Prize at TCRSF

Camp Counselor, Code Ninjas, *Chanhassen, MN*

Summers 2021 - 2023

- Lead counselor for weekly camps, teaching programming with presentational and one-on-one instruction
- Planned and implemented new lessons in Lua programming, 3D modeling, music distribution, and more

Full-Stack Development Intern, The Humanity Alliance, *Victoria, MN*

May 2021 - May 2023

- Developed full-stack administration dashboard, aiding in delivery of meals to food-insecure families
- Bridged meal request and route assignment APIs with an interactive map, eliminating manual data editing

EXTRACURRICULARS & PROJECTS

Peer Mentor, Northwestern Computer Science

Sep. 2025 - Present

- Host office hours (5 hours/week), mentoring students in COMP_SCI 321: Programming Languages

Volunteer CS Educator, Evanston-Skokie School District 65

Jan. 2025 - Present

- Teach weekly computer science classes to 5th graders at Oakton Elementary as part of Northwestern research
- Introduce students to concepts such as loops, variables, and debugging while fostering self-expression through use of TunePad, a Python-based music production tool

Embedded Software Developer, Northwestern Baja SAE

Oct. 2024 - Present

- Implement platform-agnostic, immediate-mode GUI library in C, enabling users to compose and customize layouts using binary trees and functional programming idioms
- Use said library to develop customizable heads-up display, informing driver of engine, fuel, and other metrics

Other projects (*full list at github.com/breitnw*)

- *mndco11age.xyz*: Portfolio website and webserver; developed with Rust and OpenSSL
- *rhyolite*: Vulkan-based mesh rendering engine, developed with Rust and GLSL
- *micromusic*: Apple Music miniplayer and queue manager, developed with Rust, C, and SDL2

SKILLS

Programming Languages and Tools

- *Functional*: Racket, Agda, Haskell, Nix, Emacs Lisp
- *Systems*: Rust, C, x86 Assembly, C++, GNU/Linux, Vulkan
- *General/Other*: Java, JavaScript, Python, Flask, Jinja, SQLite, Redis, L^AT_EX