

# Rajan Maghera

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## EDUCATION

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### University of Alberta

*BSc. Specialization Computing Science, Business Minor* | **GPA: 3.97/4.0 (Dean's Honour Roll)**

Sept. 2020 – present

Edmonton, AB

- **Courses:** Computer Architecture, Data Structures, Compiler Design, Algorithms

## TECHNICAL SKILLS

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**Languages:** C++, C, Rust, CUDA, JavaScript, TypeScript, Starlark, Dart, Julia, Python, Bash

**Technologies:** CUDA Toolkit, NVIDIA GPUDirect, NVMe, Linux, QEMU, Bazel, LLVM, WASM, SQL, Docker, Kubernetes

## EXPERIENCE

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### Storage Software Engineer

*Emerging Storage Laboratory, Huawei Canada*

Sept. 2023 – Aug. 2024

Toronto, ON

- Developed **Linux kernel drivers** and accompanying **user-land libraries** for high-performance **NVMe drives** with custom specification-conforming commands, with automated tests for multiple system-drive topologies emulated in **QEMU**.
- Optimized and refactored **CUDA kernels** to conform to clean-code guidelines for high-speed storage access with **nvvp**.
- Orchestrated emulated network load testing for custom topologies in **Docker Compose** with profiling tools (**perf/bcc**).
- Led team-wide effort transitioning to **Bazel** as build tool, developing custom rules and aspects for **hermetic CI/CD pipelines**, orchestrating a distributed artifact cache, and enabling fast incremental builds with high code conformance.

### Research Assistant

*Compiler Design and Optimization Lab*

May. 2022 – Aug. 2022 and May. 2023 – Aug. 2023

Edmonton, AB

- Conducted research and analysis on **Inline Caching in SpiderMonkey** focusing on emitting JIT IR and evaluating the potential for optimizing the order of lists utilized for caching frequently executed operations at call sites in **JavaScript**.
- Performed a comprehensive limit study to assess the impact of size limits on the linked lists employed for operation caching.
- Developed an internal reporting tool using **Next.js, React, and MongoDB**, designed specifically for JS benchmarks. This tool enabled efficient tracking and analysis of benchmark data, enhancing performance evaluation and optimization efforts.

### Teaching Assistant

*University of Alberta*

Sept. 2022 – Apr. 2023

Edmonton, AB

- Designed and developed lab assignments for CMPUT 229 (Computer Architecture) course, including creating automated marking scripts for efficient evaluation.
- Received positive student review scores, consistently **surpassing the median**, for teaching lessons, providing lab demonstrations, and offering consultation.

## PROJECTS

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### RISC-V Assembly Static Analysis Tool | *Compiler Design and Optimization Lab*

May. 2023 – present

- Developed a **VSCode Extension in Rust**, providing linting, calling convention, and control flow error detection for **RISC-V** assembly, addressing common mistakes made by novice assembly programmers adhering to register and calling conventions.
- Implemented parser and static analysis algorithms based on dataflow analysis, liveness analysis, and available expressions.
- Enabled real-time feedback in an IDE without external dependencies via cross-compilation to **WASM**.
- Presented work at **CASCON 2024**.

### Gazprea Compiler

Sept. 2022 – Dec. 2022

- Collaborated in a team of four to design and implement a compiler in **C++** for the **Gazprea Language**, targeting **LLVM**.
- Successfully utilized **ANTLR4** to generate the parser and emitted LLVM IR, achieving passing results on approximately 90% of teaching team tests.
- Demonstrated the ability to plan and distribute work effectively in large software engineering projects.

## AWARDS

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NSERC Undergraduate Student Research Award

2023 and 2022

Microquest Leadership Award in Computing Science

2021

Alberta Innovates Summer Research Studentship

2021

Schulich Leaders Scholarship

2020