

## Skills

- Programming Languages: Python, C++, C, Java, SQL, TypeScript
- Technologies: Git, SQLite, GNU Make, Spring, CMake, PostgreSQL, Flask, GDB, Node.js, Vim
- Selected course work: Design & Analysis of Algorithms, Performance Engineering, Information Retrieval, Compiler Construction, Operating Systems, Databases, Artificial Intelligence, Language Design and Implementation

## Education

### University of Waterloo

09/2022 to Now

*Masters of Mathematics in Computer Science (Thesis)* (94.67%)

Teaching Assistant for: Databases, Operating Systems, Algorithms, Software Analysis and Testing

### University of Ottawa

09/2016 to 04/2021

*Honours Bachelor of Science in Computer Science (CO-OP)* (8.35/10) (Deans Honours List)

Honours project - *Modelling and verifying distributed leader election algorithms with TLA+*

## Work Experience

### Research Assistant

Waterloo, Canada — 09/2022 to Now

University of Waterloo

- Software analysis and testing research

### CoreOS Software Development Student

Ottawa, Canada — 06/2020 to 08/2020

Blackberry QNX

- Developed a binary analysis tool in Python to scan and detect issues in the QNX kernel
- Wrote Unit tests in C for the QNX Neutrino kernel and hypervisor, boosting system reliability
- Used Git, GNU Make, Ghidra (reverse engineering tool)

### CoreOS Software Development Student

Ottawa, Canada — 09/2019 to 12/2019

Blackberry QNX

- Worked on a Python program to test and track new commits to Review Board thus streamlining the code review process
- Setup a QNX Hypervisor System with an Ubuntu guest to demonstrate its abilities to other teams
- Wrote Unit tests in C for the QNX Neutrino kernel and hypervisor, boosting system reliability
- Used Git, GNU Make

### Telematics Control Unit Software Developer

Ottawa, Canada — 01/2019 to 04/2019

Ford Motor Company

- Developed features and Unit tests for C and C++ multi-threaded Linux applications
- Fixed bugs and race conditions/deadlocks found by analysis tools such as Thread Sanitizer and Clang Static Analyzer
- Used GNU Make, Git, Jenkins and the Google repo tool

### Junior Programmer

Ottawa, Canada — 05/2018 to 08/2018

Canadian Border Services Agency

- Worked in a team of three to create a web application for the management of software development using Java, JSP, Hibernate, jQuery, SQL and Spring MVC
- Developed functional UI Mock-ups for the web application using HTML, CSS and JavaScript
- Gathered requirements for the web application and participated in weekly progress meetings
- Improved Unit test coverage of a separate reporting application
- Acquired the Enhanced Reliability Status level of security clearance

## Open Source Contributions

### The LLVM Compiler Infrastructure Project

<https://llvm.org/>

- LLVM is a large scale C++ project that many programming languages such as C++, Swift and Rust use for their compilers
- Wrote C++ to emit an error instead of crashing and added a unit test to validate my changes
- Pull request: <https://github.com/llvm/llvm-project/pull/70233>

## Selected Projects

### Juice: Java Compiler - Course project for Compiler Construction

01/2023 to 04/2023

- Developed a Java compiler targeting x86 with two teammates
- Consisted of 28,753 lines of TypeScript, 628 Jest unit tests and passed the majority of test cases
- Ported and upgraded an existing Intermediate Representation (IR) interpreter from Java to TypeScript to improve the debugging process
- Wrote hundreds of Jest unit tests with final code coverage of 80%

### Lettuce - New Programming Language and LLVM based compiler

07/2023 to 08/2023

- Worked with a partner to create a new programming language
- Developed compiler in C++ and added an interpreter mode using the LLVM compiler infrastructure
- Created a new Intermediate Representation using MLIR
- Source code: <https://github.com/rkchang/mlidk>

*Please see Page 2 for more Selected Projects*

## **DNS Server**

12/2021 to Now

- Wrote a DNS server with C++ and the ASIO networking library
- Used Bazel for the build system and dependency management
- Wrote Unit tests with GoogleTest
- Source code: <https://github.com/rkchang/rcdns>

## **Document Search Engine - Course project for Information Retrieval**

01/2020 to 04/2020

- Worked with a partner to create a search engine and UI for searching through a collection of course listings and news articles by using the Flask web framework
- Source code: <https://github.com/rkchang/search-engine>, Final report available upon request