Saif Khattak

Work Experience

June 2024 - Ongoing
Software Engineer - SQL Compiler, *Snowflake*, San Mateo CA
- Enforced semantic constraints on SQL queries by implementing syntax analysis passes in Snowflake's SQL compiler

Aug 2023 - June 2024
Software Engineer - FPGA Compiler, *Intel*, Toronto ON
- Enabled users to generate an Avalon-based **RTL** interface for compute kernels specified in **SYCL**
- Created an FPGA-specific **LLVM** optimization pass in **C++** that improved performance by 15% on a standard **OpenCL** benchmark suite, by using scalar evolution analysis to narrow induction variables
- Debugged complex issues across the hardware-software boundary, including investigating compiled binaries, LLVM IR, OpenCL runtime libraries, Quartus compilation pipelines, Modelsim simulations, and HAL functionality

Sep 2022 - Dec 2022
Software Engineering Co-op - SQL Compiler, *Snowflake*, San Mateo CA
- Developed data privacy features at the **SQL** query engine level for Snowflake's cloud database platform
- Added rules to an **ANTLR 3** grammar to enable managing data aggregation policies in **SQL**, enabling customers to share data while maintaining their users' privacy
- Implemented compiler changes in **Java** to parse and generate code for applying policies to a table
- Implemented changes to a custom **FoundationDB** layer to store information about policies

Jan 2022 - Apr 2022
Software Engineering Co-op - ML Compiler, *Groq*, Toronto ON
- Increased neural network inference throughput by up to 20% by designing algorithms in **C++** to efficiently utilize hardware resources for common tensor operations (e.g. convolutions)
- Created optimization passes in **C++** using the **MLIR** compiler framework to manipulate neural networks described in **ONNX** format
- Created machine learning models in **PyTorch** to run end-to-end compiler tests and measure cycle-accurate performance when run on custom neural network accelerator hardware

Jan 2020 - Aug 2020
Software Engineering Co-op - Embedded Systems, *RadComm Systems*, Oakville ON
- Researched cutting-edge radiation analysis techniques using **GNU Octave** and **Python** for data visualization to assess development options
- Implemented algorithms in **C#** to analyze radiation patterns using the **ReactiveX** library to handle real-time data emitted by an embedded device, processing energy histograms every 100ms
- Automated the device calibration process using **C#** to allow parallel setup of many devices

Education

Sep 2018 - Apr 2023
University of Waterloo, *Computer Engineering B.A.Sc*, Waterloo ON
Graduated with distinction

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