Shakil **Ahmed**

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Summary

Motivated and detail-oriented C++ software developer with a strong specialization in compiler technologies. I bring 2 years of professional programming experience in compilers LLVM/MLIR, RISCV, firmware, and simulation. I am well versed in developing and testing algorithms in modern C++ following SOLID principles. I can work independently or as part of a team. I have improved code quality through targeted reviews and contributed to impactful open-source compiler projects.

Skills

Programming	C, C++, LLVM, MLIR, FreeRTOS, Boost, QT, QML, SOLID design, LaTeX
Technologies	Git, CMake, Linux, PostgreSQL, Qemu, RISC-V Firmware, Arm Cortex, Docker, Azure, AWS
Languages	Bengali - Native English - Fluent in written and verbal communication Spanish - B1

Work Experience

Dynamic Solution Innovators Ltd.

Dhaka, Bangladesh

Assistant Software Developer

Apr. 2023 - Jan. 2025

- I tested the functional correctness of instructions for a pre-silicon RISC-V chip through bare-metal tests targeting the chip's software emulator.
- I updated emulator's code to fix bugs according to the test result. Reused the same tests to validate the chip's VHDL implementation (from hardware team).
- To optimize performance, I applied RISC-V vector intrinsics (e.g., vslideup and vslidedown), created a 2D convolution benchmark to compare vector and scalar execution, and ran Dhrystone and CoreMark for performance profiling.
- Did research on porting FreeRTOS to RISC-V and Symmetric Multi Processing.
- Improved and maintained the HAL as the hardware features kept getting updated. HAL targeted the pre-silicon emulated chip.
- Got involved in Embedded Linux system integration, application programming, and development with Buildroot while porting Linux to the pre-silicon chip.
- Had an exposure with ROS2 and Gazebo simulator. I programmed and simulated a car with C++ and ROS2.

Google Summer of Code 2022

Remote

Intern

Jun. 2022 - Oct. 2022

- Contributed to the Enzyme project by enabling LLVM's New Pass Manager support. My work focused on enabling Enzyme pass to be used with LLVM New Pass Manager side by side with the Legacy Pass Manager.

Projects

Load Store Analysis Pass

LLVM, Compiler Pass, C++

- An LLVM based compiler pass to find aliasing load store instructions inside a function. Got familiarity with AliasAnalysis passes such as MemoryDependenceAnalysis, MemorySSA.

OpenSource Contributions

MLIR, ClangIR, Compiler, Llama.cpp, C++

- I made a few little ***PRs*** to ***HEIR*** project. HEIR involves Homomorphic Encryption and MLIR.
- Made a few ***PRs*** to ***ClangIR*** project. ClangIR is an alternative intermediate representation compared to Clang AST. It retains information required to perform optimization before lowering to LLVM IR. During the Lowering to LLVMIR, informations get lost. Which would otherwise provide important optimization guideline. ClangIR takes advantage of this.
- Also made a few little ***PRs*** to ***Llama.cpp*** project. Llama.cpp provides capability of inference LLMs in pure C/C++.

RISC-V Simulator

RISCV, VM, C++

- A RISC-V simulator written using C++17 following OOP principles. It is capable of fetching, decoding, and executing load-store, arithmetic and logical shift, arithmetic operations, and conditional branching instructions.

Chip8 Emulator for Android

NDK, Emulator, Chip8, C++

- It emulates Chip8 platform written in modern C++ using Android NDK. Also used SDL2 for graphics support. An array of std::functions is used to create a table of methods where each method corresponds to an opcode. At runtime opcodes from game ROM are read and corresponding method is selected from array and invoked allowing dynamic dispatch. Games written for the Chip8 platform can be played and enjoyed in android using this emulator.

Multi-Threaded Asynchronous Web-Server and Client

Boost/ASIO, Socket Programming, Multi-Threading, C++

- A multi-threaded asynchronous web server developed using Boost/ASIO, C++17 and CMake. It serves multiple clients simultaneously. The server compiles and runs a c++ code transmitted over to it through http request and then returns the result. The web-server uses CRTP (Curiously recurring template pattern) where a templated object needs to reference itself to increase the self lifetime (scenarios like, socket waiting to serve a client). It also incorporates asynchronous programming, lambda functions and smart pointers with other language fundamentals. The server was hosted on heroku in a docker container.

Photo Viewer

Win32, Direct3D, WinUI, C++

- Renders a photo in a square-box given a photo location. Got introduction to Win32 API and Component Object Model (COM) architecture, WinUI and graphics pipeline.

Modernization of WinBGIm library

Graphics, Debugging, C++

- Improved WinBGIm graphics library to target GCC 64bit compiler for windows. The last release build by Borland was around 20 years ago and thus is now incompatible with 64bit MinGW compiler. I gave a new build. Also integrated this into a project with CMake support which is easily usable and thus helpful for beginners in graphics as it requires minimal setup.

VR Solar System

VR, Unity 3D, GOOGLE Cardboard SDK

- Created a VR app using Google Cardboard SDK for android using Unity 3D engine. With timed VR gazing, user could navigate from planet to another planet in our Solar System. Beside each planet a curved text panel shows details about distance, shape, size and also maintains relative position. The app also had a curved menu with options to select from providing an immersive and pleasant experience.

Education

SUST(Shahjalal University of Science and Technology)

Dhaka, Bangladesh

BSc. in Computer Science and Engineering

Jan. 2018 - Apr. 2023

- Session: January 2018 - April 2023
- Course Duration: 4 years
- CGPA: 3.24