Sharadh Rajaraman

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Experience

PetaGene Ltd *Cambridge, United Kingdom*
Software Engineer (C++, AWS SDK, CMake, Jenkins, C#/Avalonia, macFUSE, Windows driver programming) *Aug 2023 – Present*
 Contributed to cunoFS/Object Mount: provides POSIX-compatible file access to object storage, with a focus on performance and reliability; targeted at media, healthcare, and high-performance computing (HPC) customers.
- Led migration of entire 500 KLOC codebase from Linux-only to macOS and Windows.
- Led build tools transition from GNU Autotools and shell script to vcpkg and CMake, thus reducing build and CI run times by a factor of 10, enhancing developer productivity and enabling IDE usage.
- Led optimisations for thumbnails presented by Object Mount in Windows Explorer and macOS Finder. Improved responsiveness for media and entertainment customers by reducing network traffic by 90%. Used by a major film studio.
- Led optimisations across network mounts on macOS, allowing for server-side copy and deduplication.
- Represented the company at SuperComputing 2023, the largest HPC conference in the world in Denver, CO. Attracted ~100 leads, and several new customers.

National University of Singapore (NUS) School of Computing (SoC) *Singapore*
Undergraduate Teaching Assistant *Aug 2020 – Nov 2022*
- Taught classes in computer graphics, real-time rendering, introductory programming, and computer architecture.
- Set up auto-grading harness for computer graphics assignments to automate marking by comparing framebuffers and pixel errors.
- Conducted weekly tutorials and recitations, prepared materials and videos for students, and marked assignments.

Government Technology Agency, Singapore (GovTech) *Singapore*
Embedded Software Engineering Intern (Sensors and IoT Division: C/C++, CMake, STM32) *May 2022 – Aug 2022*
- Implemented a C++ wrapper over Linux Serial Peripheral Interface (SPI) syscall interface. Reduced wheel-reinvention, and improved linkage for other projects using C++.
- Implemented firmware on an STM32 microcontroller in C++ to emulate a Trusted Platform Module (TPM) over I^2C for Raspberry Pi (rPi). Improved security on the rPi, and saved costs on purpose-built TPMs.

Skills

Languages	C++, C#, Python, Java, LaTeX, GLSL/HLSL, F#, TypeScript, PowerShell
Frameworks & Tools	OpenGL, DirectX, Vulkan, OpenMP, CUDA

Projects

Personal projects and contributions

vulkan.cppm (Merge request)
C++20 module for Vulkan-Hpp (C++, CMake)
- Adapted a code generator to output a C++20 module interface file for the Vulkan-Hpp wrapper library.
- Improved type safety and performance by exporting C macros and function-like macros as `constexpr` variables and functions.

Coursework
Oat Compiler
Compiler for statically-typed, C-like Oat language with Python-like list comprehension (OCaml, Menhir)
- Front-end outputs a subset of LLVM IR; back-end compiles IR to a subset of x86_64 assembly.
- Includes compile-time type-checking and optimisations e.g. constant folding, dead-code elimination, and register allocation with graph colouring.

Also enjoyed working on, from scratch:
- **cache-sim** (C++20, CMake), which implements a variety of cache-coherence protocols for a quad-core CPU;
- **Lexer and parser for a C-like toy language** (C++17), using recursive descent parsing and `std::regex` state machine.

Education

National University of Singapore *Singapore*
Bachelor of Computing (Honours) in Computer Science; 2nd Major in Physics *Aug 2018 – May 2023*
- Computer science: parallel computing; real-time computer graphics; operating systems; compiler design.
- Physics: astrophysics; quantum mechanics; solid-state physics.

Extracurriculars

Indian classical music
Carnatic vocal, violin *Sept 2003 – Present*
- Completed diploma in Carnatic vocal music in 2012 and violin in 2013
- Solo performances since 2010 in Singapore, India, Australia, and the UK
- Conducted workshops and classes on Carnatic music theory and practice for beginners