RYAN COHEN

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PERSONAL PROJECTS

Caliga Bootloader A boot loader project where I learned how to get information from and interact with modern hardware. Also learned how to interact with firmware such as UEFI and create a physical memory manager.
Pumpkin Computer Working on a RISC-V RTL design along with connected peripherals such as a JTAG module for debugging. My plan is to use this computer as an open-source hardware testbed for developing operating systems.
RyanOS An operating system project with a custom UEFI boot loader. I learned how to run my operating system on emulators and on real hardware. Worked on a libc implementation and a UEFI interface library.
toy-bootboot A project to re-implement a boot loader protocol on my own. Learned how to adhere to a protocol and how to create and run a UEFI boot loader.
chip8-rp2040 An emulator for the CHIP-8 interpreted language on a microcontroller with an OLED screen.
ssd1306-rp2040 A library for interfacing with a 128x64 OLED screen using I2C. Used in chip8-rp2040.
rraytracer A ray tracer implementation based on the book "Ray Tracing in One Weekend" by Peter Shirley. Learned how a 2D image can be generated from a scene of 3D models using linear algebra.
rtga A C library for interfacing with a TGA image file. Used in rraytracer for generating ray-traced images.

OPEN SOURCE CONTRIBUTIONS

Ripes (My Commits)
- Assisted in developing a generalized ISA assembler.
- Developed a library for defining generalized ISA information and instruction details at compile-time.
- Currently working on dynamic and filterable Qt interface for users to interact with a database of generalized ISA instructions. (Github Issue) (Github Pull Request)
- Fixed bugs and submitted bug reports.

GRUB Boot Loader
- Fixed two integer underflow vulnerabilities in the command line that affected all supported systems. (Commit)
- Fixed an out-of-bounds write vulnerability in the VGA text module affecting some BIOS systems. (Commit)

Limine Boot Loader
- Fixed a bug. (Commit)

UEFI-rs
- Contributed documentation to understand better how the library's APIs work and how they could be used.
- Fixed a bug where the Rust panic handler function would log an unnecessary file name. (Commit)

SKILLS

Programming Languages C/C++, Rust, Python, Bash, Assembly/Disassembly (x86_64, ARM, RISC-V), Verilog/SystemVerilog
Development Tools Git, Github Actions, GNU Make, CMake, GCC, QEMU, GDB, Ghidra, Vivado
Hardware Programming x86_64 (no OS), Microcontrollers, Xilinx FPGA, OLED Screens
Firmware UEFI
Frameworks Qt

EXPERIENCE

Mentee - Ripes September 2023-
Linux Foundation *Remote*
- Worked with my two mentors and another intern to make the contributions described above, in the Open Source Contributions section.
- Discussed projects, bugs, features, and ideas with my mentors.

Assistant of IT Summer 2018
South Shore Charter Public School *Norwell, MA*
- Set up 100+ new Chromebooks for students
- Helped teachers with IT problems
- Helped set up devices and networking in the new High School building

- Ensured that all Ethernet sockets worked properly on the newly built floor of the High School building
- Helped teachers set up technology in their classrooms (PCs, projectors, speakers, etc.)

Assistant of IT Summer 2016
South Shore Charter Public School *Norwell, MA*

- Set up 200+ new devices for students and teachers (iPads, Macbooks, PCs, and Chromebooks)
- Helped teachers with IT problems
- Helped teachers set up technology in their classrooms (PCs, projectors, speakers, etc.)

EDUCATION

UMass Lowell, Bachelor of Information Technology - In Progress, GPA: 3.94 Spring 2023-
Bristol Community College, 2020-2022
Associate of Computer Information Systems - Computer Science Transfer to UMass, GPA: 3.95
Scituate High School, High School Degree, GPA: 3.39 2015-2019