Alex O'Brien

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Computer Science student with experience in IT and software development and a fascination with robust and well-engineered systems.

Education

2020–2022
Second Year

Bachelor of Science/Master of Data Science (Graduate Degree Package), The University of Melbourne

Majoring in Computing and Software Systems. Maintaining an average grade of *First-Class Honours*. Relevant subjects include *Algorithms and Data Structures*, *Computer Systems*, *Probability*, and *Statistics*.

2019

Mathematics Extension (MTH1040), Monash University

Achieved a *High Distinction* average.

Skills

Computing

Fundamentals Deep understanding of hardware and software architecture — all the way from CPU architecture to operating systems implementation.

Programming Experience in a variety of languages and paradigms, including object-oriented and functional practices. Most fluent with Rust, C, and C++, with working knowledge of Java, Python, Go, JavaScript, x86_64 assembly, and others. Very capable of learning on the fly and picking up new technologies quickly.

Security Understanding of security best-practices and fundamentals with common services (e.g., Apache and nginx), with experience in implementation of real systems.

Operations Experience both in a personal and professional context with the administration and maintenance of common enterprise technologies, including Active Directory, Open Directory, Profile Manager, and Unix-descended systems (Linux and FreeBSD in particular).

Communication

Written Strong written communication skills both in an informative and argumentative style.

Spoken Experience and success in competitive speaking and debate.

Instruction Served as a teaching assistant/mentor in mathematics for a year 10 mathematics class in 2019. Coached debate team and assisted with year 10 programming classes throughout 2021.

Other Interests

Systems Knowledge of operating systems design and implementation. Currently implementing a kernel and a web server. *(see projects)*

Compilers Presently designing and implementing a rudimentary C compiler. *(see projects)*

Physics Deep interest in the field, particularly in particle physics, astrophysics, and cosmology.

Experience

References available upon request.

2021

Debate Instructor, John Monash Science School

Instruction
Communication

Helped coach the JMSS debate team throughout the 2021 school year. Provided instruction in argumentation technique, personal feedback, and supervision at competitions and events.

2020

Software Developer, Embedthis Software

Embedded
Web
Security

Delivered version 2.2 of the GoAhead embedded web server:

- ▷ Modernized and cleaned up the codebase, backporting and implementing significant security fixes, including seven CVEs.
- ▷ Maintained API compatibility and stability for existing applications.

2016–2017

IT Technician, University Prep

IT
Technical Support
Systems Administration

Worked two summers full-time in general IT and support, involving a variety of tasks in multiple areas of expertise, including:

- ▷ Maintained images across multiple platforms and OS versions. Also delivered brand-new images for the organization's upgrade to Windows 10.
- ▷ Delivered a new library checkout system using Raspberry Pis as thin clients.
- ▷ Managed device setup for new staff and equipment – testing, imaging, and communication with end-users.

Projects

Names are hyperlinked to repository/reference.

2020-present

Short Circuit, Web Server

Servers
HTTP

A high-performance web server for Linux using the new io_uring asynchronous I/O interface.

- ▷ Unix network programming.
- ▷ HTTP parsing and implementation.
- ▷ Performance profiling and optimization.

2019-2020

3cc, C Compiler

Compilers
Parsing

A C compiler in Rust. Features a lexer and hand-written recursive descent parser. Currently implements most unary and binary operators and has early support for local variables. On the backburner, pending a better re-implementation.

2017–present

Syzygy, Kernel

Operating Systems
Computer Architecture

A kernel implemented in Rust, currently featuring physical and virtual memory management, an initramfs, and interrupt handling. Presently working on multitasking.

- ▷ Kernel and bare-metal programming.
- ▷ `no-std` Rust programming.
- ▷ x86_64 architecture and assembly.

2019

Beamline for Schools, Physics Competition

Particle Physics
Written Communication

A CERN competition in which secondary school teams submit proposals for an experiment to be conducted using a particle accelerator. Project was among 20 globally shortlisted.