

David Wood

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Open Source

Rust Programming Language

Compiler Team Contributor

Oct 2017 - Present

I'm a regular contributor to the rustc, the Rust compiler. Currently, I'm a member of the non-lexical lifetimes (NLL), async/await and diagnostics working groups, and a co-lead of the polymorphisation and meta working groups. Amongst my most notable contributions, I've implemented the non-exhaustive attribute from RFC 2008, and polymorphisation, a code-size and compile-time optimisation which reduces unnecessary monomorphisation.

Work Experience

Codeplay Software Ltd.

Software Engineer, Compiler + Infrastructure

Edinburgh, Scotland

Sep 2017 - Present

At Codeplay, I'm currently the primary maintainer of the continuous integration infrastructure and lead the effort to rebuild the core infrastructure with NixOps to improve reproducibility.

I worked as a compiler engineer on SYCL support for NVIDIA GPUs which was contributed to Intel's DPC++. I implemented driver support in Clang for the `nvptx64-nvidia-nvcl-sycldevice` target, target-specific passes in LLVM, builtins in libclc and various bug fixes to LLVM, Clang and the LLVM-SPIRV translator.

Within the infrastructure team, I'm responsible for providing technical expertise and leadership on the reproducible configuration of the build and office infrastructure. In addition, I create internal resources and tools for teaching and mentoring colleagues on new technologies, such as Nix. Furthermore, I maintain a handful of internal tools, both for use within the infrastructure team and in engineering teams.

Scottish Engineering

Software Consultant

Glasgow, Scotland

Sep 2018 - Nov 2018

Following the success of previous work with Polaroid Eyewear and West Dunbartonshire Leisure, I was contracted to work on a data analysis tool for Scottish Engineering which enabled summarization and filtering of yearly survey results. Working with stakeholders from Scottish Engineering and understanding their business requirements was essential before designing an appropriate solution.

Codeplay Software Ltd.

Intern Build Engineer

Edinburgh, Scotland

May 2017 - Sep 2017

During a summer, I rebuilt the entirety of Codeplay's continuous integration infrastructure in my internship - introducing automated re-provisioning of Ubuntu, CentOS and Windows build nodes and improving the configuration management, vastly reducing the turn-around time of changes requested by engineering teams and downtime which impacted engineering team productivity. In addition, I made various improvements to internal tools relied on by engineering teams.

West Dunbartonshire Leisure

Software Consultant

Alexandria, Scotland

Apr 2015 - Feb 2017

Following my work with Polaroid Eyewear on their 10K Race Series website, I worked closely with West Dunbartonshire Leisure to create a landing page for their 10K race series - a continuation of Polaroid Eyewear's series. After consultation with the team at West Dunbartonshire Leisure to understand their requirements, I built a functional, easy-to-use and easy-to-update website which requires very little maintenance and launched to great user feedback in February, 2017.

Polaroid Eyewear

Software Consultant

Dumbarton, Scotland

Jun 2014 - Jun 2016

Polaroid Eyewear contracted me to build a shop floor information system - MIDAS - an ASP.NET system which is the backbone of Polaroid Eyewear's lens manufacturing. Working within the structure of the IT team, I worked closely with the final users to define new features and enhancements. MIDAS went live in September, 2014 to excellent user feedback.

During the summer of 2015, I built and designed a fully-featured web-based Inventory Manager system and a suite of desktop applications for tracking the performance of the Warehouse. Both projects required independence and coordination with other departments and employees. These well-designed applications released on schedule with brilliant feedback from users.

Following the success of MIDAS, I worked on creating an updated, modern website for Polaroid Eyewear's 10K Race Series - the e-commerce website allowed runners to enter any of the four races in the series and be assigned and shipped their race number. After launching the new website to great feedback, the series saw an increase in runners, charitable donations and saved money on payment processing costs.

Education

University of Glasgow Glasgow, Scotland
MSci Software Engineering with Work Placement, Honours of the First Class Sep 2015 - Jun 2020

I graduated with a GPA of 20.0 (out of a maximum 22.0) and completed my Master's Project on "Polymorphisation"¹, an code-size optimisation in the Rust compiler to reduce unnecessary monomorphisation during code generation. In my first year, I was awarded "Best Computing Science Student Intending Single Honours" and in my fifth year, "Most Outstanding Project in MSci SE WP".

In my second year, I led a team which developed a domain-specific continuous integration platform in Python for testing coursework of "Web App Development 2". Docker containers were dynamically provisioned which ran testing on student-provided Git repositories containing their coursework.

Similarly, in my third year, I worked in a team tasked with creating a event-sourced financial platform^{2 3} for Avaloq, a banking software company. For the duration of the project, I managed and led development on the event bus and the "superclient". Both written in Rust, the event bus is the central server that manages and persists events while ensuring consistency, correlation and horizontal scaling of microservice clients; the superclient is a framework for building client applications in Lua with persistence and exposing a REST API.

Additionally, this involved working with the team to design and implement the various solutions that allowed the system to achieve the desired properties; to streamline and improve our development processes; and to mentor other team members in fixing bugs and building features when working with unfamiliar technologies.

Glasgow Calidonian University Glasgow, Scotland
Nuffield Foundation Placement May 2014 - July 2014

While on a summer placement at Glasgow Caledonian University, I implemented a colour-based tracking algorithm from a research paper in C++ with OpenCV^{4 5} which was capable of full 360 tracking of multiple objects simultaneously including when the object leaves and re-enters the frame.

Furthermore, I built a tool for non-photorealistic rendering using OpenCV to make an image look less realistic - in essence, creating a cartoon out of an image. Images were processed in two distinct stages - extracting the edges from the image and overlaying them on a copy of the original image that uses a reduced set of colours.

Vale of Leven Academy Alexandria, Scotland
Secondary Education Aug 2009 - May 2015

Advanced Highers: Computing (A), Graphic Communication (A)

Highers: Mathematics (A), Physics (B), Chemistry (B), Geography (B)

Standard Grades: English (2), German (2)

Memberships

British Computer Society
Professional Membership Jun 2020 - Present

Open Source Initiative
Individual Membership Feb 2020 - Present

Published Articles

Inside Rust Blog
Improving async-await's "Future is not Send" diagnostic October 2019

¹https://davidtw.co/media/masters_dissertation.pdf

²https://davidtw.co/media/autokrator_dissertation.pdf

³https://davidtw.co/media/autokrator_presentation.pdf

⁴https://davidtw.co/media/camshift_report.pdf

⁵https://davidtw.co/media/camshift_poster.pdf