Charles Cabergs

> Versatile software engineer with 5 years of experience, specializing in C/C++, Rust, Python, DevOps, and Linux system administration.

Education

2019-2021 School 19 (École 19)

- **Program:** Self-paced, project-based learning focused on programming and software engineering.
- **Key Highlights:**
  - Engaged in a collaborative learning environment, relying on peers and online resources for knowledge acquisition.
  - Developed expertise in **C** by rewriting its standard library from scratch and learning **C++** by re-implementing standard containers (vector, map, etc.).
  - Acquired skills in multi-threading using mutex and semaphores, container orchestration with **Docker** and **Kubernetes**, and low-level programming with **Assembly**.
  - Designed and implemented a shell from scratch, enhancing understanding of system programming and command-line interfaces.
  - Created and maintained open-source testing tools for various projects, gaining experience in collaborative development, code review, and project management within the school community.

Experience

2021 - Feb 2024 **Software Engineer**, Colruyt Group

- **Easycheckout:** Developed a checkout system leveraging camera and barcode recognition to improve efficiency and reduce workplace injuries for employees.
  - **Technologies Used:** Python, Go, Docker, Kubernetes, Yocto, Grafana, Loki, Prometheus
  - **Role and Contributions:** Wrote a significant portion of the code for edge devices handling barcode recognition. Developed the entire monitoring stack for the system and a service discovery service in Go lang.
- **Smartcart:** A cart with a barcode reader and cameras removing the need for queue before checkout
  - **Technologies Used:** C++, Python, Docker, ROS
- **Causality:** Data science library designed to simplify causal inference tasks.
  - **Technologies Used:** Python, pandas, dash
  - **Role and Contributions:** Wrote the entire library from scratch, focusing on enhancing causal inference capabilities.

- Developed CI/CD pipelines and improved development tooling for data scientists (Docker, CI/CD, Linux).
- Assisted Data Scientists, Robotics Engineer and Computer Vision Engineer in writing clean and reliable code.

Jul 2024 - Nov 2024 **Embedded Software Engineer**, Cleveron

- **Firmware developement:** Wrote the firmware for smart auto regulating radiator valves
  - **Technologies Used:** Rust, ESP32
- **Maintaining AWS backend:** Collect data from the IoT devices and process it in various ways.
  - **Technologies Used:** AWS, AWS IoT, CloudWatch, Lambda, EC2
- **Building a device programmer:** Wrote scripts to setup multiple programmers device to setup the IoT devices
  - **Technologies Used:** Rust, Ansible, Linux, Raspberry Pi, SSH proxy/port forwarding

Dec 2024 - Present **Software Engineer**, Intellis

- **Trading execution engine developement:** Writing a C++ execution engine which applies an AI's decision while optimizing for cost per trade and time to market
  - **Technologies Used:** C++, ZeroMQ, Docker, Postgres
- **AI runtime library:** Writing a C++ library with Python bindings to run model in production with an emphasis on reduced evaluation time
  - **Technologies Used:** C++, ONNX, pybind11
- **Gateway:** Writing a C++ API translation layer service for 20+ broker/exchanges with a client library allowing easier communication to the outside world for the internal services
  - **Technologies Used:** C++, ZeroMQ, FIX, Websocket, Javascript

Skills

- **Programming Languages:** Python, C/C++, Go, Rust, Shell, Assembly, Haskell, Lisp, Lua, Javascript, SQL
- **DevOps:** Docker, Kubernetes, Podman, Openshift, Grafana, Loki, Prometheus, CI/CD pipelines, Azure, S3
- **System Administration:** Ansible, Linux (Ubuntu, Debian, Alpine, RedHat, Arch)
- **Other Relevant Skills:** Git, GitLab, Github, AGILE Methodology, Problem-solving

Side Projects & Hobbies

- **YouTube Channel with 11'000+ subscribers:** A computer science focused YouTube channel with a series of videos on C programming, tooling around C, deploying your own Git server, explaining UNIX utilities, etc..
- **Side Projects**
  - **Visualizations:** Mandelbrot sets, Boids simulations, Fourier series, and Cardoids (C/C++, Rust).
  - **Command-Line Utility Analysis:** Undertook in-depth analysis of standard UNIX commands by rewriting key utilities like sed, coreutils, ping, and tar (C/C++).
  - **Memory Allocation Development:** Engineered a custom memory allocator (malloc clone): mellow (C/C++)
  - **Language Design and Implementation:** Designed and developed custom programming languages, including lci (Lambda Calculus Interpretor) and computorv2 (Mathematical expressions interpretor) (C/C++, Haskell).

    - **Home Lab:** Bought four small computers and made a Kubernetes cluster with them (with k3s) on which I host a monitoring stack with Prometheus and Grafana, websites, a git server, an image service (Photoprism), a multimedia service (Jellyfin). I also have a Raspberry Pi that serves as a DNS/DHCP (dnsmasq) and VPN (Wireguard) server. I maintain all of my personal servers with Ansible.
    - **Building Computers:** Picked the parts and assembled desktop computers for myself and family members.
- **Open-Source Contributions:**
    - **cppzmq:** Improving the usability of the C++ bindings for ZeroMQ (Support for timers, CURVE encryption and other).
    - **quickfix:** Adding compatibility with some modern C++ (`std::chrono` and `std::optional`) to this FIX protocol library.
    - **reflect-cpp:** Adding automatic compile-time conversion from camel case to snake case
    - **Minishell test:** Automatically test the minishell project for other school 42 students (Python).
    - **C Formatter 42:** Formatter for the school 42 coding style (Python).
    - **Skorch Library:** Added logging integration with MLflow (Python).
    - **MLflow Library:** Implemented compatibility with pathlib (Python).

Languages

- **French:** Native Proficiency
- **English:** Fluent

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