Francesco Forcher

PERSONAL DATA

Current location: Zurich and Lugano, Switzerland Email: francesco.forcher@gmail.com

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PERSONAL GITHUB: github.com/f-forcher
LANGUAGES: English C2, Italian native

SUMMARY

Software Developer and **Machine Learning Engineer** with **over 6 years** of **professional** experience, driven by a lifelong passion for programming and mathematics. I emphasize fast, reliable, iterative development with good attention to detail. **ETH Zürich CSE MSc**.

ABOUT ME

- Main areas of interest include Rust development, AI/Machine Learning, Computer Vision, NLP, physics, robotics, High-Performance Computing (HPC), functional programming, distributed systems.
- Good teamplayer, I have experience working in teams with different structures. I've learned to tap into each team member's strengths to get the best results.
- Always on the look for better tools and methodologies, I proactively seek improved ways to handle problems.

TECHNOLOGY AREAS

Currently:

Previous experiences:

Rust, Python, Julia, Data Warehouse, Docker, Kubernetes, Time Series Forecasting C++, Java, R, Javascript/Typescript, Stochastic Differential Equations, Deep Learning,

Matlab

EMPLOYMENT

Jun 2021 - Mar 2024



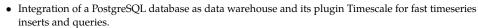
Rust Database Developer and AI Engineer at Natzka

Contributed to the design and development of a next-generation OLAP database for data warehousing:

- Development of several engine and query language features, such as Boolean formulas and COUNT algorithms, with Rust.
- Integration of AI/ML features into the product. Bringing Python and Julia scripts from research
 prototypes into production-ready containerized microservices, integrating state-of-the-art Gaussian
 Process based time series forecasting services optimized for low latency.
- Worked on a custom Julia distributed logger for observability.
- Research on a custom **Kubernetes predictive autoscaler** for our deployments.
- Advanced custom load testing with **Grafana k6**.
- Contributed to database API development, including gRPC and REST API. Implemented different
 caching and paging mechanisms.

Jan 2021 - Jun 2021

Data warehouse Consultant at **BLU software**



- Used **Talend** and **Airflow** for **ETL/ELT** workloads.
- Created interactive forecasts of demand using Facebook's Prophet framework.

SEP 2016 - MAY 2018

Data analyst at CERN, BE-ABP-HSS



CERN Technical Student in the Beams Department, Accelerator and Beam Physics Group.

- I developed advanced statistical routines using Python Pandas and scikit-learn to analyze crystal parameters for CERN's UA9 experiment.
- Enabled the analysis of **very noisy** datasets, with a significant impact in the tender process to award the crystal manufacture contract worth **several hundred thousands CHF**.
- My thesis has been published as CERN internal note.
- Using C++ ROOT library, I developed routines to analyze nuclear dechanneling for high energy
 particle beams in bent crystals, improved the simulation accuracy of SixTrack software.

SEP 2018 - DEC 2020

ETH Zürich Master's Degree in Computational Science and Engineering



Master's degree with a selection of courses on high performance parallel computing, differential equations, Computational Statistics, Deep Learning and Computer Vision.

May 2020 - Dec 2020



Master thesis at Paul Scherrer Institut

ETHZ CSE Master Thesis at Paul Scherrer Institut, titled: "Intrusive Uncertainty Quantification of Maps"

- Developed an application to perform intrusive **Polynomial Chaos** expansion to **quantificate uncertainty** in simulations based on approximate Hamiltonian maps, using **symbolic computation**.
- A deep learning network approach has been evaluated to speed up the stochastic map calculation.
- Developed in Python using SymPy and scaled into a distributed process using Dask.
- Project: "Precise Simulation of a Compact μEDM Storage Ring". Utilizing scipy, a high-precision fully relativistic numerical simulation of a small scale muon storage ring has been developed.

JULY 2020

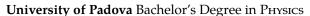
Swiss National Supercomputing Centre Summer School: Effective High-Performance Computing and Data Analytics with GPUs



How to effectively exploit state-of-the-art hybrid High-Performance Computing (HPC) systems, with a special focus on Data Analytics. Some topics covered:

- GPU architectures, GPU programming (CUDA and OpenACC)
- Python HPC libraries (Numpy/SciPy/Dask/Numba)
- Machine Learning and GPU optimized frameworks (Rapids)
- Deep Learning on HPC platforms (TensorFlow)

OCT 2013 - SEP 2017





Physics degree with an emphasis in Computational Physics, simulations, statistics and data analysis.

WORKS AND ACHIEVEMENTS

- AI, ML, NLP, Computer Vision
 - Contributed to a public policy study by using the OpenAI ChatGPT-4 API to perform reliable automated large-scale thematic and sentiment analysis of reports scraped from companies and organizations' websites.
 - Research on code and query generation with LLM, using agentic LLM frameworks and vector databases such as AutoGPT and Weaviate.
 - Gesture Controlled Robot: As High School final project, I developed an Arduino robot controlled remotely through Bluetooth by hand movements, detected from an Android application using the OpenCV Computer Vision library. Uses Java and Arduino languages.
- ETH projects
 - Deep Learning: Imaging Time-Series to improve deep neural networks forecasting.
 - How to write fast numerical code: High performance implementation of Density Estimation with Distribution Element Trees.
 - Design of Parallel and High Performance Computing: Fast parallel implementation in C++ and OpenMPI of an algorithm for the construction of a suffix tree.
- SILVER MEDAL at the 2nd level **XXVII Physics Olympics**, Venezia and Treviso, 2013