Omar Elrefaei

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Profile

Results-oriented engineer with a proven ability to dive into unfamiliar codebases, identify bottlenecks, and ship improvements. Strong testing and debugging instincts paired with clear communication skills. Experience spans performance optimization, tooling development, and deployment automation.

Professional Experience

Independent Contractor, *JuliaEarth - Geospatial tooling*   Mar 2025 – May 2025
- Wrote a parser to convert geospatial coordinate references from WKT2 string format to JSON.
- **Validated parser compliance** against the GeoJSON schema by developing integration tests.
- Vendored the EPSG dataset as an artifact to eliminate the need for a C++ dependency.

Independent Contractor, *NSF Center for Quantum Networks*   Nov 2024 – Dec 2024
- Developed benchmarks for **automated detection of performance regressions**.
- Improved maintainability by integrating static analysis and **runtime validation into test suite**.

Bank of Canada, *Software Engineer*   Jan 2023 – Aug 2023
Implemented core features for a macroeconomic modeling suite in Julia
- Built capabilities for higher-order approximations of Dynamic Stochastic economic models.
- **Optimized performance** of kronecker matrix products by interfacing with Fortran LAPACK.
- Ensured robustness of numerical routines through careful **unit-testing**.
- **Drafted engineering recommendations** regarding adoption of auto-differentiation libraries.
- Developed graphical reports for new forecasting capabilities.
- Assisted in deploying a legacy **matlab codebase on a Linux HPC** cluster.

Lumentum, *Optical Testing Software Developer*   Sep 2021 – Mar 2022
Led the development of an in-house data processing tool using **C#, dotnet, and SQL**.
- Processed over 200,000 hardware testing results into an **analytics database**.
- Achieved 80% reduction in ingress time by batching **SQL transactions**.
- **Designed a WinForms UI** for previewing and cleaning parsed data.
- Maintained data integrity when importing noncompliant files with **fail-safe parsing**.
- Improved colleagues' workflow by automating Excel processing with **Python and Pandas**.

Alolom, *Junior DevOps Developer*   May 2020 – Aug 2020
- Deployed JupyterHub through Github CI/CD using Docker and Kubernetes.
- Developed tools for automated Python AST source-code transformations.

Education

University of Waterloo, *BASc Nanotechnology Engineering*   2019 – 2024
Capstone project: EV battery thermal management system for subarctic climates using nano-enhanced phase change materials
Highlighted coursework:
- Systems and Performance programming (C, Rust, async, multi-threading, CUDA, profiling)
- Statistical Regression and Forecasting (R, tidyverse, ggplot2, glmsdata)

Volunteering - Event Coordinator

Working with the local community since early 2024 to organize regular events.
- Set up multi-microphone sound system for bi-weekly events.
- Assisted in executing, and liaising with campsite staff for a community spiritual retreat.

Skills

Programming patterns
Functional programming
Object oriented design
Concurrent and multi-threaded techniques
Flame graph performance profiling
Debugging using Valgrind and GDB
GPU CUDA programming

Soft skills
Computer technical support
Writing technical documentation
Researching state-of-the-art practices
Reading and navigating research papers
Brainstorming outside the box solutions

Linux and DevOps
C, gcc, libcurl, pthreads
Docker containers
Slurm job scheduler
bash, ssh, sftp
apt, dpkg, rpm

Data analysis and visualization
RStudio, tidyverse, ggplot2
Numpy, Pandas, matplotlib
Python - Excel automation
Jupyter Notebooks

Testing and deployment
Continuous integration
Functional and regression testing
Ticket or Kanban issue tracking (Github, Jira)

Laboratory skills & techniques
Material Characterization
- Microscopy: SEM, AFM
- Structural analysis: XRD
- Spectroscopy: UV-Vis, FTIR
- Thermodynamic analysis: DSC

Molecular Biology
- Polymerase Chain Reaction
- Gel Electrophoresis
- Chromatography