

(Robert) Cameron Rutherford

HPC/ML/Q Research Software Engineer

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🌐 cameronrutherford 🌐 Robert C Rutherford

Summary

Experienced HPC/ML/Q Research Software Engineer with 4+ years of expertise in deploying, optimizing, and teaching scientific software on diverse computing systems, including the world's largest supercomputers and quantum computers. Proven track record in end-to-end solution delivery, project leadership, and effective team coordination, while adept at managing social engineering challenges in software development processes.

Experience

Software Engineer III HPC/ML/Q, PNNL (Virtual) 2024 - Present

- HPC MLOps offering lead, maintaining container and spack module stacks for users
- Continued work on previous and new projects, with DevOps support as needed

Software Engineer II HPC/ML/Q, PNNL (Virtual) 2022 - 2023

- Facilitated deployment of ExaGO application to the cloud with OpenAI integration on AWS
- Led lab-wide tutorial on HPC MLOps utilizing containers and Open On Demand
- MLOps internal offering leader developing containerisation and MLOps best practices community
- Led Software Stack for ExaSGD project to Frontier deployment C++ / HIP (top500 #1)
- Aided development of C++ / CUDA / HIP targeted Sparse GPU solver tailored for use case with HiOp
- Assisted in Fortran (CPU) -> C++ (GPU) conversion for E3SM project through CI/CD
- Succeeded in sourcing \$30M+ in funding over 5 years through ExaGO / E3SM follow on project

Software Engineer I HPC/ML/Q, PNNL (Virtual) 2021 - 2022

- Received PNNL's highest performance award (OPA) for a second year in a row
- Led Privacy Preserving ML project to explore FHE, FL, DP and SMC applications in PNNL mission space
- Led tutorials and boot camps for PNNL staff on using JAX, Qiskit, and other parallel ML/computing concepts
- Maintained CI/CD for several ML projects and supported novel library exploration/development
- Transitioned into leadership of ExaSGD software stack across LLNL, ORNL, PNNL and NREL
- Deployed ExaSGD CI/CD across [x86_64/amd64/ppc64le] x [AMD/NVIDIA], learned HIP/AMD

Post-Bachelors Research Associate HPC/ML/Q, PNNL (Virtual) 2020 - 2021

- Received PNNL's highest performance award (OPA)
- Moved to internal HPC team supporting all lab hardware and projects using compute (HPC/Q/Custom)
- Deployed CI/CD for ML Python package neuromancer, testing deployment on PNNL HPC
- Worked on open-source MLFlow offering to save lab \$200k per project contract on WandB subscription
- Learned Quantum Computing basics to enable C2QA project research on IBM Quantum platform
- Successfully scaled ExaSGD C++ / MPI software to Summit (top500 #7, former #1)

Tech Student 4 Optimization and Control Group, PNNL (Virtual) 2020

- Deployed C++ / RAJA MDS linear algebra kernels in HiOp as well as designing unit tests
- Learned CMake, Spack, GitHub/GitLab pipelines and QA/testing of C++ codebases
- Developed skills in performance profiling of CUDA, MPI, OpenMP and hybrid applications
- Taught other project developers about RAJA, GPUs and best practices learned

Sports Events Coordinator, Whitworth University (Spokane, WA) 2019 - 2020

IT Intern, Mac Management, Keysight Technologies (Colorado Springs, CO) 2018

Calculus III Grader / Mathematics Tutor, Whitworth University (Spokane, WA) 2017, 2019

Basketball Coach, S.G.S. & M.L.C (Sydney, AUS) 2015

Publications

- C.S. Oehmen, S. Peles, K. Swirydowicz, C.G. Petra, S.G. Abhyankar, W. Jones, M. Reynolds, **R.C. Rutherford**, **Advanced Computing Is at the Forefront of a New “Moonshot” Revolutionizing the North American Power Grid** (IEEE CSE 2024)
- S. Abhyankar, S. Peles, T. Becejac, J. Holzer, A. Mancinelli, **C. Rutherford**, **Exascale Grid Optimization (ExaGO) toolkit: An open-source high-performance package for solving large-scale grid optimization problems** (2022)
- S. Abhyankar, S. Peles, **R. Rutherford**, A. Mancinelli, **Evaluation of AC optimal power flow on graphical processing units.** (IEEE PESGM 2021)
- S. Peles, M. Alam, A. J. Mancinelli, K. Perumalla, **R. C. Rutherford**, J. Ryan, C. G. Petra, **Porting the Nonlinear Optimization Library HiOp to Accelerator-Based Hardware Architectures** (2021)

Skills

Python	Machine Learning	DevOps	C / C++17	Other
torch, JAX, pyg, mpi4py, pybind11, conda/mamba, poetry	LLMs, RL, NTK, FL, DP, SMC, GNNs, Domain Aware ML	GitHub/GitLab, vim/tmux, SLURM/LSF, HPC, quarto, VSCode	CUDA, HIP, CPU/GPU Profiling, MPI, OpenMP, CMake, Spack	Go, Rust, Fortran, Graph DBs, SQL, Qiskit, AWS, S3 dev-containers

Conferences

PRESENTER	National Laboratories Information Technology (NLIT) Summit: 2024
Practice and Experience in Advanced Research Computing (PEARC)	2023
Pacific Northwest National Laboratory (PNNL) Tech Fest	2021-2023
Energy Exascale Earth System Model (E3SM) Annual Meeting	2023
Sustainable Tools Ecosystem Project (STEP) East Coast Town Hall	2023
Exascale Computing Project (ECP) Annual Meeting	2021-2023
Pacific Northwest National Laboratory (PNNL) Innovation Summit	2022
Co-Design Centre for Quantum Advantage (C2QA) Annual Meeting	2022

Education

Scientist & Engineer Rising Leader Learning Journey	2023
Cyber Security & National Security Seminar Series, PNNL	2021 - 2022

Whitworth University, B.S. Computer Science and B.S. Mathematics: G.P.A 3.93/4.0

Outstanding Mathematics Major '20 ICPC PNW Site Winner '18 Howard R. Gage Scholarship '17, '18, '19

Other Activities

Sustainable Horizons Institute HPC Mentor	2022, 2023
Quantum Information Science / HPC STEM Mentor	2022 - Present
Whitworth Chess Club President	2019 - 2020
Pine Codes Hackathon Winner	2019
SpokAnimal Shelter Volunteer	2019
Whitworth Men's Basketball Team	2016 - 2019