Aaron Barlow

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Experience

Oak Ridge National Laboratory

HPC Software Engineer, National Center for Computational Sciences | Jun 2020–Present | Remote

- Developed privacy-preserving federated learning on Frontier (TOP500 #2), enabling cross-institution healthcare data training on AMD GPUs. Integrated NVFLARE with ROCm/MI250X and PyTorch, produced HIP-compatible builds, and implemented Slurm integration with mTLS. Validated multi-node training rounds previously unachievable on Frontier, used for building privacy-preserving medical foundation model.
- Optimized directories API: switched Jbuilder to JSON:API serializer, added Redis caching for hot reads. Cached responses now 178–206 ms (down from 272 s, ∼1320× faster); first-hit 298.5 s → 246.8 s (−17%). Eliminated view rendering (252 s → 0 ms) and cut ActiveRecord time (19.2 s → 8.8 ms). Stabilized fleet-wide polling and removed cluster sync timeouts.
- Managed and scaled myOLCF, a researcher self-service and monitoring platform used by approximately 4,000 users across 1,000+ projects, achieving 99.9%+ availability. Delivered 12 FY2025 releases governing access, allocation, and policy across open, moderate, and secure enclaves.
- Built the Smart Facility metrics platform (backend in Crystal/Amber) to ingest compute, data, I/O, and efficiency metrics. Designed pre-aggregated dashboards delivering 100k-record views with low latency and serving 50k time-series points in 87 ms. Benchmarked 10.4k requests/sec per CPU core (96 µs/req) for simple JSON. Shifted heavy computation to background jobs and index tables. Utilized by lab leadership to guide next-generation procurements and benchmark domains, flagging inefficient Slurm jobs.
- Unified day-to-day operations across 27 HPC clusters, including Frontier, via a central policy-as-code service. Automated project provisioning, access control, and scheduler policy across SLURM/LSF enclaves, serving as backbone software for a $700M+ compute fleet and mixed open-to-secure environments.
- Accelerated build, startup, and test cycles by migrating to Vite and optimizing CI processes. Reduced build times from 2 minutes to 9 seconds (−92%), startup times from 30 seconds to <200 ms (−99%), and test durations from 90 seconds to 6 seconds (−93%), significantly cutting developer idle time and speeding up review cycles.

Bank of America

ML Engineer Intern, Consumer, Small Business & Wealth Tech | Jun–Aug 2019 | Los Angeles, CA

- Built an NLP entity-extraction (such as names and addresses) pipeline for 100M+ documents, achieving a 96% F1 score and supporting $20M+ annual automation savings.

Oak Ridge National Laboratory

Software Developer Intern, National Center for Computational Sciences | May 2015–May 2019 | Oak Ridge, TN

- Developed HPC services, applications, and BI tools, shipping production features for internal portals. Automated supercomputer-access communications with a policy-aware email system and built a WordPress/REST plugin to sync and display HPC metrics on olcf.ornl.gov, improving data freshness and reducing manual updates.

Skills

- **Languages** Ruby, Python, Go, Crystal, C, C++, C#, JavaScript, SQL, Bash, HTML, SASS
- **Frameworks** Ruby on Rails, Amber, Vue.js, React, NVFLARE, CrewAI, PhiData
- **Tools** Docker, Kubernetes, Kustomize, Argo CD, Slurm, CI/CD, Redis, PostgreSQL

Education

East Tennessee State University

Bachelor of Science, Computer Science | GPA 3.94/4.00 | May 2020

Activities: ACM President (2019–2020); Ethical Hacking VP (2018–2019)

Selected Projects

- **Automatic podcast creation.** 192 episodes, 1.8k downloads, 50+ hours listened; Claude Sonnet scripts → ElevenLabs TTS → Spreaker auto-publish.
- **Automatic e-commerce creation.** 152 products, 57k+ views; $0.31 per product; GPT orchestration + Flux Pro images → Printful/Etsy/Redbubble auto-publish.
- **Project Cadenza (agentic music + video).** 150 videos published; pipeline creates artists/albums, lyrics → song (Suno/Udio), mastering, thumbnails, YouTube upload/scheduling; ISRC/metadata prep.

Professional Activities

- **Talks:** CUG 2025 — ”Employing a Software-Driven Approach to Scalable HPC System Management.”; NLIT 2024 — ”Employing DevOps in HPC Operational Management.”
- **Community:** ORNL Pathways to Computing Workshop Chair (2022–present); PEARC Student Program Committee Chair (2021–present)