Aaron Barlow

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Experience

Oak Ridge National Laboratory

HPC Software Engineer | Jun 2020–Present | Oak Ridge, TN

- Exascale federated learning on Frontier. Ported NVFLARE to ROCm/MI250X (PyTorch with HIP-compatible builds), packaged deterministic ROCm containers, and integrated with Slurm + mTLS in secure enclaves; validated multi-node rounds and enabled current medical foundation-model training on Frontier.
- 1320x faster directories API. Jbuilder → JSON:API serializer + explicit Redis caching for hot reads: cached hits 0.206 s (from 272 s, −99.92%); first-hit 298.5 s → 246.8 s (−17%). Eliminated view render and cut ActiveRecord 19.2 s → 8.8 ms; stabilized polling and removed cluster-sync timeouts.
- myOLCF scale & reliability. Owned researcher self-service used by 4k users across 1k+ projects with 99.9%+ availability; 12 FY2025 releases governing access, allocations, and policy across open → secure enclaves.
- Smart Facility metrics (Crystal/Amber). Pre-aggregated dashboards deliver 100k-row views with 87 ms latency; simple JSON at 10.4k req/s per CPU core (96 us/req). Informs next-gen procurements (RAM/IO/GPU/storage) and flags inefficient Slurm jobs.
- Fleet policy-as-code backbone. Unified operations across 27 clusters (Slurm/LSF): automated project provisioning, access control, and scheduler policy; eliminated manual back-office corrections.
- GitOps & CI speedups. Standardized delivery with Kustomize + Argo CD on Kubernetes (GitLab runners). Migrated to Vite: builds 2 min → 9 s (−92%), startup 30 s → <200 ms (−99%), tests 90 s → 6 s (−93%); faster reviews, fewer idle cycles.

Bank of America

ML Engineer Intern | Jun–Aug 2019

- Built NLP entity-extraction service for financial documents at 96% F1, supporting $20M+/yr in automation savings.

Oak Ridge National Laboratory

Software Developer Intern | May 2015–May 2019 | Oak Ridge, TN

- Year-round development of HPC-centric services, applications, and BI tools; shipped production features across internal portals. Automated supercomputer-access communications via 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 update toil.

Skills

- **Languages / Backend:** Ruby, Python, Go, TypeScript, SQL, Bash · Rails, FastAPI/Flask, gRPC, REST, Redis, Postgres
- **Infra / ML / Agentic:** Docker, Kubernetes, Kustomize, Argo CD, Slurm, CI/CD, Prometheus/Grafana, OpenTelemetry, ROCm, Vault · NVFLARE, PyTorch (ROCm), HIP · Multi-agent orchestration (CrewAI), autonomous pipelines, headless uploaders, queueing/retries

Education

East Tennessee State University

Bachelor of Science, Computer Science | Dean's List | 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.
- **AI prediction-market trading (Kalshi).** Multi-agent analysis (CrewAI) + realtime feeds, vector DB, Kelly sizing; selects market and executes end-to-end in <6 min (dev); Dockerized services and live dashboard.
- **Anthologia (AI video storytelling).** 20-sec, 4-scene videos; typical 4–12 min per production; DALL·E 3 + Veo 3 (Kling fallback), ElevenLabs SFX, LatentSync lip-sync; automated QC/fallbacks.
- **More agentic systems.** Auto movies, books, music videos; policy-driven data synthesizer; HOA platform (Rails+React, prod-ready).

Talks & Community

- **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)