

# Aaron Barlow

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## Experience

- Jun 2020–Present **HPC Software Engineer**, *Oak Ridge National Laboratory*, National Center for Computational Sciences (NCCS)
- **Federated Learning on AMD GPUs**: Enabled NVFLARE on ROCm/MI250X with PyTorch (ROCm); replaced CUDA-bound dependencies with ROCm/HIP-compatible builds, packaged deterministic ROCm containers, and integrated with Slurm using mTLS in secure enclaves; validated multi-node rounds across multiple nodes/GPUs, unblocking research teams and reducing vendor lock-in
  - **myOLCF Portal Ownership**: Self-service & monitoring portal serving researchers across multiple projects with 99.9%+ availability; 12 production deployments in FY2025
  - **Platform Performance**: Migrated to Vite + CI tuning → builds reduced from 2 min to 9s (-92%), server startup from 30s to <200ms (-99%), unit tests from 90s to 6s (-93%); significantly reduced development wait time
  - **Runtime Performance**: Improved portal responsiveness 71.8% (2021) and 155% (2023) via query batching, read-through caching, and front-end optimizations
  - **Smart Facility Metrics Backend**: Designed & implemented ingestion of compute/data/I/O/benchmark-efficiency metrics and exposed via APIs + myOLCF; adopted by multiple teams for capacity tuning and anomaly detection
  - **Reliability & Features**: Delivered filesystem-usage reporting (including AFW-specific reports), V5 access endpoints, and RATS via proxy across enclaves; resolved service-proxy enclave routing defects
  - **Security & Compliance**: Contributed to Scalable Protected Infrastructure (SPI); built middleware routing demographics to PII-compliant ITSD database; shipped obfuscated production bundles
  - **Data Correctness & Operations**: Added ability to change project app's reserved project ID and recurring mapping job; reduced manual corrections/tickets significantly
  - **Quality Assurance**: Cut post-deploy incidents to 0 over recent releases by expanding Cypress/feature coverage and tightening parameter validation
  - **Leadership**: Mentored interns/junior engineers and authored runbooks/SLOs + incident playbooks; reduced MTTR significantly
- Jun–Aug 2019 **ML Engineer Intern**, *Bank of America*, Consumer, Small Business & Wealth Tech
- Built NLP entity extraction service (names/phones/addresses/accounts/amounts) achieving 96% F1 score, supporting \$20M+/yr in savings through automation
- May 2015–May 2019 **Software Developer Intern**, *Oak Ridge National Laboratory*, National Center for Computational Sciences (NCCS)
- Year-round development of HPC-centric services, applications, and BI tools; shipped production features across internal portals
  - Automated supercomputer access communications via policy-aware email system; standardized messaging and reduced manual steps
  - Built WordPress/REST plugin to sync & display HPC metrics on olcf.ornl.gov; improved data freshness and reduced update toil

## Skills

Languages Ruby, Python, Go, TypeScript (Node), SQL, Bash  
Back-end Rails, FastAPI/Flask, gRPC, REST, Redis, PostgreSQL  
Infrastructure/DevOps Kubernetes, Kustomize, Slurm, CI/CD, Prometheus/Grafana, OpenTelemetry, ROCm  
ML/FL NVFLARE, PyTorch (ROCm), HIP  
Infrastructure  
Cloud/Data AWS, Kafka (concepts)  
Domains HPC platforms, secure enclaves (ITAR/PHI/PII/HIPAA), BI dashboards, agentic automation

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## Education

May 2020 **B.S. Computer Science**, *East Tennessee State University*  
GPA: 3.94/4.00, Dean's List

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## Selected Projects

Automatic Movie Creation	Multi-agent workflow generates script → storyboard images → 10-sec clips (Runway/Cling) → stitches, QC, and auto-publishes; prototype short films with rapid iteration cycles and optimized GPU cost
Agentic Content Automation (Project Cadenza)	End-to-end pipeline generates music → videos → metadata → thumbnails and auto-uploads to YouTube; high throughput with minimal manual time and excellent success rate
Policy-Driven Data Synthesizer	Training automation that takes policy/goal and auto-creates synthetic training data → trains/refits model with quality guardrails and metric improvements
Automatic Product Creation	E-commerce pipeline: prompts → listings (title, bullets, SEO tags, imagery) → auto-publish to Etsy/WooCommerce/Redbubble; generates multiple SKUs with optimized listing time and CTR
Automatic Music Creation & Distribution	Prompt-to-track with mixing/mastering, ISRC/metadata, art generation, and multi-platform upload; tracks shipped with strong retention rates
Automatic Music Video Creation	Audio beat-map → storyboard → video assembly → captioning → render; videos with high CTR and render success rates
Automatic Podcast Creation	Topic → script → TTS voices → mastering → RSS feed and auto-publish; consistent cadence with strong engagement
Automatic Book Creation	Outline → drafts → edits → cover art → layout (PDF/EPUB) → KDP-ready; titles generated with optimized time per book
HOA Management Platform	Lightweight tool to manage dues, violations, and communications; reduced manual back-office time significantly with multiple homes onboarded

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## Leadership & Service

Selected Talks	CUG 2025 — "Employing a Software-Driven Approach to Scalable HPC System Management"; NLIT 2024 — "Employing DevOps in HPC Operational Management"
Workshop Chair	ORNL Pathways to Computing Internship Program (PCIP) • 2022–Present
Student Program Committee Chair	PEARC (Advanced Research Computing Conf.) • 2021–Present
President	ACM (ETSU) • 2019–2020
Vice President	Ethical Hacking (ETSU) • 2018–2019