

Aaron J Smith

📍 Durham, NC

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Summary

Computer science Ph.D. specializing in video coding and compression, now building exabyte-scale storage and network systems at AWS in Rust; US patent in layered video coding, former UNC professor.

Experience

Amazon Web Services, Raleigh, NC *July 2022 – Present*
Network Product Development — Software Development Engineer *May 2025 – Present*

The Rust replacement for AWS's legacy switch agent, translating Linux kernel network state into ASIC hardware

- Owned the specification of correct daemon behavior, adopted as the team's ground truth, enforced by property-based testing over random event sequences; mentored an engineer through the event generator
- Root-caused and fixed defects in the daemon's core data path: a kernel-to-hardware desynchronization traced through the Linux kernel source to conflicting definitions of route identity, and a deadlock where ACL entries with identical content shared one key while the Myers diff addressed them by position
- Moved the team off legacy release pipelines onto a dedicated pipeline gating on lint, unit and integration tests, and a pre-production stage of physical switches; showcased org-wide as a model for other teams

Amazon S3 — Software Development Engineer *July 2022 – May 2025*

Amazon S3 Vectors, a new public vector storage service

- Owned the public API design as an early engineer, driving the design review with principal engineers and the security team before authoring the spec in Smithy
- Delivered an asynchronous compaction service that raised sustained per-index PUT throughput 8x to 40 MB/s, removing compaction from the customer request path

Log compression, the Rust format behind Amazon's exabyte-scale logging fleet

- Owned the state machine and the auto-detection behind zero-config onboarding, which unlocked fleet-wide adoption and nine-figure annual storage savings
- Drove adoption across S3's index services and seven log-reader libraries, writing the Java and Python bindings that unblocked those teams; led three engineers building fleet-wide tracking of unrealized compression savings
- Uncovered a log data-loss risk in a gzip-to-Zstandard migration, reproducing it by stress-testing service restarts until an ungraceful shutdown corrupted logs; designed the mitigation that kept the migration on schedule
- Led a real-time Apache Iceberg ingestion system for the same log data from prototype to production at petabytes per day, decomposing the design across two engineers

University of North Carolina at Chapel Hill *July 2021 – July 2022*
Teaching Assistant Professor *Chapel Hill, NC*

Taught two courses per semester including a special-topics course in data compression, with roughly 300 students and 15 paid learning assistants

Education

University of North Carolina at Chapel Hill
Ph.D., Computer Science, "Receiver-Driven Video Adaptation" (M.S. awarded 2019) *August 2014 – August 2021*

- Designed a rate-sorted entropy coder that sorts arithmetically coded symbols into quality layers a receiver can drop with no extra signaling; US [patent](#), [dissertation](#), and an M-JPEG [reference coder](#) in Java
- Residual-domain HEVC/H.265 [transrater](#) in C++ on the HM reference software, retargeting bitrate by requantizing coded residuals rather than fully decoding and re-encoding

Coastal Carolina University, B.S. in Computer Science and Applied Mathematics, 4.0 GPA *May 2014*

Skills

Languages: Rust, Java, Python, C++, C, TypeScript, SQL

Media & compression: H.265/HEVC, H.264/AVC, M-JPEG, FFmpeg, arithmetic coding, Zstandard, gzip

Systems: AWS (S3, DynamoDB, ECS/Fargate, Lambda), distributed systems, Smithy, gRPC, Linux networking (netlink)