Matthew Marshall

Software Engineering Leader

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Passionate and detail-oriented software engineering leader with extensive experience in distributed systems, cloud-native architectures, and finance. Skilled in designing and optimizing high-performance systems, leading engineering teams, and delivering critical enterprise solutions. Proven track record in leading complex technical initiatives, implementing scalable architectures, and driving operational efficiency in fast-paced environments. References available upon request.

Experience

Lotic Labs, Inc.

Apr 2016 – Apr 2024

Boston, MA

Co-founder

Lotic Labs developed software to manage climate-induced financial risk for water utilities experiencing large revenue swings. The platform simulated specialized financial scenarios for weather risk transfer (insurance) and included features for the optimization of water pricing and financial liquidity.

- Directed NSF-funded R&D as PI for two grants (1722276 and 1927042) focused on using symbolic AI and optimization to address climate-based financial risk management. Managed personnel, budgets, timelines, and reporting requirements.
- Designed internal knowledge base of financial and hydrologic data using Apache Jena, crafted ontologies in OWL-DL and demonstrated advanced SPARQL query evaluation capabilities.
- Automated feature engineering using PyData tools to derive descriptive models of customer financial sensitivity to climate.
- Developed cloud-native risk simulation application using Python, Java, and Next.js for configuring and executing stochastic financial forecasts through an intuitive web interface.
- Optimized geospatial clustering algorithm for reinsurance customer, significantly reducing O(n2) runtime complexity for distance matrix calculations by using H3 as a discrete global grid system and parallelizing with TensorFlow.

SAVVI Financial, LLC

Apr 2025 – Present

Waltham, MA

Lead Software Engineer

SAVVI Financial builds AI-driven benefits and retirement-income guidance for employers and their employees, delivered through partners including PlanSource and Alight. The work spans two tracks: the customer-facing APIs and onboarding tooling that carry those implementations, and aion — a declarative, formally specified application platform, together with the build and deploy substrate beneath it.

- Architect and principal author of aion (~6,200 of 6,450 commits), a declarative, multi-tenant application platform where AI agents are first-class participants under machine-checked contracts, together with the build and deploy substrate it runs on.
- Mechanized the normative specification in Lean 4: a 57-RFC suite reduced to a seven-proposition kernel, with 1,400+ machine-checked theorems across 570 modules covering permission algebra, bitemporal CRDT convergence, safe schema migration, and typed-expression soundness. Proofs run as Bazel test targets, so a spec regression fails CI like any other test.
- Built a Kubernetes-native coding-agent fleet: a Go/kubebuilder operator reconciling Agent, AgentTask, AgentChannel, and HumanPrompt custom resources into resumable, S3-checkpointed runner Jobs, coordinated over NATS JetStream with an MCP tool surface, human-in-the-loop resume, and durable spawn/handoff/merge lineage.
- Designed agora, proof-carrying capability auctions layered above MCP: tools publish typed SPARQL BGP capabilities and bid per intent; a second-price Vickrey allocation dispatches the Chandra–Merlin containment witness as typed arguments, closing the NL-to-arguments hallucination gap. Truthfulness, KG consistency, and ledger solvency are machine-checked in Lean.
- Authored rules_lora, Bazel-native LoRA fine-tuning: typed SFT datasets validated at build time, declarative torchtune/peft recipes, a RunPod H100 backend, and an ExpertManifest routing contract, plus a Rust/candle adapter merge validated byte-exact against peft for two-stage fluency-rebase training. Trained a Qwen2.5-1.5B NL-to-BGP parser and an 8-dimensional box embedding for schema.org grounding.

Apr 2024 – Feb 2025

FundGuard, Inc.

Dedham, MA

Lead Software Engineer

FundGuard is a cloud-native investment accounting platform for investment accounting and financial operations. I drove key feature development, improved system architecture, contributed to strategic infrastructure initiatives, and assisted in the interviewing and hiring process to help build the Boston R&D team.

- Led the development of a microservices-based portfolio benchmarking engine using gRPC and Protobuf, supporting arbitrarily complex composite index calculations, real-time FX conversion, and flexible fund performance comparisons.
- Developed real-time and scheduled exception controls for money market funds using Kafka, enabling users to configure custom compliance alerts pertaining to cash transactions and expense yield impacts across funds and share classes.
- Designed and implemented the NAV Impact Report, giving users visibility into the effect of accounting events on fund yield and NAV over time with a versioned history.
- Authored technical thought leadership detailing code improvements, system architecture, and developer best practices.

Jan 2012 – Apr 2024

M Software Solutions LLC

Freelance Full-Stack Software Developer

Full-stack software consultant working with a select group of clients to deliver bespoke but cost-effective data engineering, data analysis, and visualization tools. Projects generally start with disparate datasets and a hypothesis about how the data can be leveraged for business insight. From there, a process of lean and rapid prototyping informs the ultimate scope and direction for the client.

- Advised data engineering team for 2 years at unicorn alternative protein company on data pipeline design in GCP.
- Developed serverless ETL in AWS Lambda for forensic accounting system, analyzing 30M transactions in PostgreSQL.
- Led design and implementation of iOS mHealth app and web portal for nutritionist telehealth platform.

Oct 2010 – Nov 2011

Orbis Investment Management Limited

Hamilton, Bermuda

Software Developer in Test

Institutional asset manager with $31B AUM returning +4.2% versus the MSCI World Index. Orbis presented the unique opportunity to work at an internal startup building a new fund exchange platform (OrbisAccess) for their nascent retail investment business.

- Designed integration testing and quality metrics for critical parts of the fund subscription and redemption processes.
- Deployed automated remote code coverage and instrumentation using WMI on Windows Server.
- Coordinated and led university programming competition; designed and implemented recruitment portal.

Education

2010

Massachusetts Institute of Technology

B.S., Electrical Engineering & Computer Science

Undergraduate research culminated with the development of a mobile app for creating labeled reinforcement learning datasets for wearable sensor data. The app let the user adjust the position of a stylized stick figure so that the activity sensor data could be properly classified. This project preceded the mobile era and was written for Windows CE using several custom graphics libraries and toolkits. Activities: MIT Football, Lambda Chi Alpha.