ANANTHA PADMANABHAN

Founder & Principal Researcher, Capital Markets AI | Agentic LLM Solutions Architecture · LLM Evaluation · Capital Markets Risk

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SUMMARY

Founder & Principal Researcher at Capital Markets AI, where I design and ship production agentic AI on the Anthropic Claude API — multi-agent systems with tool use, human-in-the-loop controls, and a production safety stack — and publish research on fractal risk intelligence and quantum-augmented risk (Claude Certified Architect – Foundations, Aug 2026). Grounded in 20+ years of capital-markets risk technology: 13 years as Global Head of Technology Presales at Calypso ($50M ARR; 10 Solutions Architects across NA/EMEA/APAC; CME, Citigroup, HSBC, HKMA, SGX) and 6 years as Director at EZOPS (AI-powered reconciliation, +$15M ARR, 25-member engineering team). Three SSRN working papers, a forward-tested Treasury PoC, and a classical tensor-network measurement of the multifractal cascade's quantum representability.

KEY ACHIEVEMENTS

Revenue Growth: Achieved $50M ARR in 3 years | **Process Improvement:** Led projects reducing deployment time by 25% | **Team Building:** Built 25-member engineering team in Chennai; 10-member product team for EZOPS Data Modeler | **ISO-27001:** Secured certification in 3 months

SKILLS

AI/ML & Architecture: Claude AI (Anthropic), Claude Code, MCP (Model Context Protocol), Multi-Agent Systems, Agentic Orchestration, RAG Pipelines, LLM Evaluation, Structured Outputs (JSON Schema), Human-in-the-Loop (HITL), AI Governance & Safety, Vector Databases, LangChain, Quantitative Modeling (MMAR), Microservices, API Design

Quantum & Tensor Networks: Tensor Networks (MPS/TTN), Quantum Amplitude Estimation, Quantum State Preparation, Quantum-Augmented Risk Architecture

Cloud & DevSecOps: AWS, GCP, Azure, Kubernetes, Docker, Redis, Datadog, Kafka, Snowflake, ETL

Solutions Architecture & GTM: Solutions Architecture, Forward Deployed Engineering, Enterprise GTM, Pre-Sales Strategy, Executive Engagement, Customer Success

Domains: Financial Services, Risk Management, Compliance, Capital Markets, Derivatives, XVA, Basel III/IV

Programming: Python, Java, Spring Boot, JavaScript, React, SQL, GitHub, Anthropic API

PROJECTS

Quantum-Augmented Risk — Architecture & Loading-Layer Representability PoC | capmarkets-ai.com/quantum-computing

- Seven-layer deep-tail risk architecture positioning quantum compute at the tail-sampling layer — backend-agnostic across gate-model hardware, bridging on-premises trading/risk infrastructure to cloud-mediated quantum compute
- Ran the classical tensor-network proof-of-concept measuring whether the multifractal cascade is efficiently representable as a matrix product state; the result reopens the loading layer as a candidate for quantum advantage (necessary, not sufficient — no advantage claimed), with a fully reproducible protocol

Treasury PoC V1.5 — Forward Feasibility Test of Text-Aware Regime-Adjusted MMAR | capmarkets-ai.com/treasury-poc

- Forward feasibility test of a text-aware, regime-adjusted MMAR model for 10-day VaR: an LLM-emitted regime signal drives a multifractal volatility engine, with frozen-corpus forward discipline and a full audit trail from textual evidence to engine output
- Pre-registered falsification protocol (Expected Shortfall as primary metric, published thresholds) committing to publish a negative result; three-lab adversarial review (Claude / Gemini / Grok) before publication

Capital Markets Reconciliation Platform — Open Source | capmarkets-ai.com/reconciliation-platform.html

- Designed and built a production-grade enterprise reconciliation platform with six Claude agents (Anthropic API tool use) for break investigation, broker onboarding, pattern analysis, config review, sign-off briefings, and natural-language queries
- Parallelized pipeline (config-driven transform and reconciliation workers, Redis caching, queue-per-tier architecture) processing 100K+ records in under 300 seconds; multi-cloud Kubernetes deployment with an OpenAPI 3.1 REST interface
- Production agent safety stack — human-in-the-loop write blocking, tool-result envelopes, hallucination guard — with circuit-breaker, retry, cache, token-budget, and concurrency patterns; ML layer with SHAP explainability and anomaly detection
- Maker/checker workflow, data lineage with provenance tracing, DR (RPO 15 min / RTO 30 min), GDPR/MAS/SEC data residency, and SOC 2 Type II control mapping

CM·RAG — Capital Markets Knowledge Assistant — Open Source | github.com/ananthaP6167/cm-rag

- Browser-based RAG application for capital-markets professionals on the Anthropic API — 25-document regulatory knowledge base (Basel III/IV, XVA, SIMM, FRTB, SA-CCR, EMIR, ISDA netting) with relevance-scored retrieval, voice input, and a full retrieval-trace panel; open source

PUBLICATIONS

Quantum-Augmented Risk Management for Capital Markets: An Architectural Perspective and Empirical Loading-Layer Measurement — SSRN Working Paper (Abstract ID 6874958) | June 2026

- 55-page combined paper: an architectural framework positioning quantum compute at the tail-sampling layer of a seven-layer deep-tail risk design, paired with a direct empirical measurement of whether the multifractal (MMAR) cascade is efficiently representable as a matrix product state
- Empirical result: bond dimension saturates the maximum 2^(K/2) across both lognormal and binomial multiplier laws — the cascade is not efficiently representable under matrix-product-state or balanced tree-tensor-network ansatzes, reopening the loading-layer question as a candidate location for quantum advantage rather than closing it; necessary but not sufficient for advantage, and no quantum-advantage claim is made

Risk Intelligence: A New Era for Capital Markets — SSRN Working Paper (Abstract ID 6584378) | April 2026

- 27-page original framework combining Mandelbrot's fractal mathematics (MMAR, α-stable distributions) with LLM agentic intelligence for market risk, counterparty credit risk (XVA, PFE, wrong-way risk), and liquidity risk (LaR, execution strategy)

Risk Intelligence: A New Era for Institutional Finance — SSRN Working Paper (Abstract ID 6615841) | April 2026

- 23-page institutional companion framework targeting CCPs, custodians, SIFIs, pension funds, and regulators — fractal precision for capital adequacy (Stable-VaR, H-adjusted scaling), sovereign architecture (Q/P separation with regulatory bridge to FRTB, SA-CCR, SIMM), and LLM-generated ICAAP/ILAAP supervisory narratives

EXPERIENCE

Founder & Principal Researcher East Windsor, NJ
Capital Markets AI *2026 – Present*

- Founded an independent applied-AI and research practice for capital-markets risk; design and ship production agentic systems on the Anthropic Claude API
- Built and shipped a production-grade multi-agent reconciliation platform — six Claude agents with tool use, human-in-the-loop controls, and a production safety stack; processes 100K+ records in under 300 seconds on multi-cloud Kubernetes
- Built CM·RAG, a browser-based capital-markets knowledge assistant on the Anthropic API over a 25-document regulatory corpus (Basel III/IV, XVA, SIMM, FRTB)
- Designed and published Treasury PoC V1.5 — a forward-tested VaR architecture pairing an LLM regime signal with a multifractal (MMAR) volatility engine, validated through three-lab adversarial review
- Authored three SSRN working papers (105 pages) on fractal risk intelligence and quantum-augmented risk architecture; earned Anthropic's Claude Certified Architect – Foundations (Aug 2026), Professional tier in progress

Principal Consultant — Calypso Implementation (Contract Engagement) Jersey City, USA
Fidelity Investments *2024 – 2025*

- Engaged for senior Calypso expertise to lead front-office functional implementation for collateral management, securities lending, and repo — including cashflow matching configuration and interest/inflation swap processing
- Escalation reviewer for cashflow-related issues; reviewed the end-to-end counterparty-default workflow for cleared derivatives, advising on implementation options within Calypso's standard default-management functionality
- Advised Fidelity's operations and onboarding teams through product rollout, clearing validation, and reporting

Director — Product Engineering, Client Services & Sales New Brunswick, USA
EZOPS Inc *2017 – 2023*

- Led full sales cycle from POC scoping through contract close with tier-one capital markets institutions, increasing ARR by $15M for AI-powered compliance and reconciliation platforms
- Architected Java microservices, HTML5 interfaces, and TensorFlow-based ML algorithms, reducing data reconciliation time by 20% on 10M+ row datasets
- Built and managed 25-member engineering team in Chennai, attaining ISO-27001 certification in three months
- Partnered with sales leadership to identify AI use cases, scoping POCs and resolving adoption blockers

Global Head of Technology Presales — Enterprise Risk Solutions New York, USA
Calypso Technologies Inc *2004 – 2017*

- Owned full sales cycle from prospecting through close, selling $50M ARR in enterprise risk solutions to investment banking and capital markets clients including CME, HKMA, SGX, BOVESPA and other major exchanges
- Built and managed a global team of 10 Solutions Architects across North America, EMEA, and APAC — setting pre-sales engagement methodology, conducting performance reviews, mentoring technical talent, and scaling team capacity to support enterprise pipeline growth
- Led global delivery of derivatives trading solution for investment banking clients including Citigroup, HSBC, and other major banks
- Architected enterprise risk products for market, credit, XVA (CVA, DVA, FVA), and liquidity risk with Basel III compliance

Early Experience (Pre-2004) New Jersey, USA

- Pinnacle Systems Inc — Manager/Architect, Global Delivery | IBM Global Services — Manager/Architect, Global Delivery

CERTIFICATIONS

Claude Certified Architect – Foundations — Anthropic, 2026
Certificate in Risk Management — Nassim Taleb, New York
Certificate in Quantitative Finance (CQF) — Paul Wilmott, New York

EDUCATION

B.Sc. Applied Sciences (Mathematics & Physics) — Madurai Kamaraj University, India