SHUNYA | शून्य

The HFT Infrastructure Platform for the Modern Quant

Zero friction. Infinite precision. Pure execution.

Executive Summary

SHUNYA (Sanskrit: शून्य, "zero" or "void") embodies the Zen philosophy of reducing complexity to its essence—the empty space from which all possibilities emerge. In trading, the void represents zero latency, zero friction, zero compromise. SHUNYA is a cloud-native, modular HFT infrastructure platform that abstracts the complexity of building production-grade algorithmic trading systems, enabling quantitative desks, prop shops, and hedge funds to deploy sophisticated strategies without the overhead of building core infrastructure from scratch.

Market Opportunity: India's B2B fintech SaaS market is projected to reach $50 billion ARR by 2030, with enterprise solutions growing at 40% CAGR [web:46][web:52]. The global algorithmic trading infrastructure market shows similar momentum, with platforms like AlgoTrader commanding $2,500-$250,000+ annual contracts [web:19]. SHUNYA targets the underserved mid-market: quantitative desks with $1M-$50M AUM who need institutional-grade infrastructure without enterprise pricing.

Core Value Proposition: SHUNYA provides the "picks and shovels" for the algo trading gold rush—a composable infrastructure stack that combines your proprietary market microstructure research (DQRH, MDLT, eSSVI volatility calibration) with modern cloud architecture, enabling customers to deploy trading strategies in hours rather than months.

I. Product Architecture & Core Modules

SHUNYA follows a **microservices architecture** deployed on AWS, leveraging placement groups and shared CPGs (Cluster Placement Groups) for ultra-low latency [web:35]. The platform is organized into seven integrated modules:

1. Market Data Ingestion Layer | *Sūkṣma* (सूक्ष्म - "subtle")

Purpose: Unified, normalized real-time and historical market data from multiple exchanges.

Components:

- **Multi-Exchange Gateway**: Direct connectivity to NSE, BSE, MCX via FIX protocol and native APIs [web:13][web:15]
- **Level 2/3 Order Book Reconstruction**: In-memory order book maintenance with nanosecond timestamping using AWS Time Sync PTP [web:35]
- **Data Normalization Pipeline**: Converts heterogeneous exchange formats into canonical SHUNYA schema
- **Market Data Store**: TimeSeries database (QuestDB) optimized for tick-level queries [web:36]

Key Features:

- **WebSocket Streaming**: Sub-millisecond L2 order book updates via asyncio architecture [web:21]
- **Smart Rate Limiting**: Dynamic throttling based on exchange rate-limit headers (e.g., "Remaining: 14/sec") [web:21]
- **Historical Replay**: Backtest-ready tick data with microsecond precision
- **Redundancy**: Active-active multi-region failover across Mumbai (ap-south-1) and Singapore (ap-southeast-1) AWS regions

Your Differentiator: Integration of your **MDLT (Multidimensional Liquidity Detection Framework)** as a real-time liquidity scoring engine that filters "ghost liquidity" from executable depth [web:26][web:29][web:30].

2. Strategy Engine Framework | *Yukti* (युक्ति - "strategy")

Purpose: Modular, pluggable strategy execution environment with pre-built quant models.

Components:

- **Strategy SDK**: Python/C++ abstraction layer exposing market data, order management, and risk APIs
- **Pre-Built Strategy Modules** (licensed separately):
  - **Optimal Execution Suite**: Almgren-Chriss, Implementation Shortfall (IS), Adaptive TWAP/VWAP with slippage modeling
  - **Volatility Arbitrage**: Your proprietary **DQRH (Dynamic Quadratic Replication Hedge)** for options market making
  - **Market Making**: Inventory-aware Avellaneda-Stoikov framework with mid-price prediction
  - **Statistical Arbitrage**: Cointegration-based pairs trading with regime detection
- **Event-Driven Pipeline**: Single-threaded, lock-free execution path optimized for latency [web:13]
- **Regime Detection AI**: ML-based market state classifier (high volatility / mean-reverting / trending) using Redis Feature Store [web:21]

Key Features:

- **Hot-Swappable Strategies**: Deploy new strategies without system restart via containerized strategy pods
- **Parameter Optimization**: Bayesian hyperparameter tuning with walk-forward validation
- **Custom Strategy Support**: Users can deploy proprietary Python/C++ strategies adhering to SHUNYA SDK interface
- **Backtesting Integration**: Identical codebase runs in live and backtest modes with tick-perfect replay

Your Differentiator: Pre-packaged implementation of your published research—DQRH, MDLT liquidity filtering, eSSVI volatility surface calibration [web:31][web:34]—as licensed strategy modules generating recurring IP revenue.

3. Volatility Surface Calibration Engine | *Tāraṅga* (तरङ्ग - "wave")

Purpose: Real-time, arbitrage-free implied volatility surface construction for options strategies.

Components:

- **Multi-Model Calibration**: eSSVI, SABR, SVI, Heston models with neural network acceleration [web:31][web:34]
- **HyperIV Integration**: Hypernetwork-based surface construction generating arbitrage-free surfaces in <2ms using only 9 market observations [web:34]
- **Greeks Calculator**: Real-time Delta, Gamma, Vega, Theta, Rho computation across entire portfolio
- **Surface Monitoring**: Intraday recalibration detecting regime changes in volatility structure [web:40]

Key Features:

- **Calibration Speed**: Sub-2ms surface generation vs. 45-second traditional calibration [web:37]
- **Arbitrage Constraints**: Automatically enforced calendar spread, butterfly, and no-arbitrage conditions
- **Surface API**: REST/WebSocket endpoints serving interpolated IVs for any strike/expiry combination
- **Historical Surfaces**: Version-controlled surface snapshots for research and compliance

Your Differentiator: Integration of your eSSVI calibration methodology with neural network speedup, enabling real-time options trading that institutional desks pay $50K-$200K/year for [web:19].

4. Smart Order Router & Execution Gateway | *Prāṇa* (प्राण - "breath/life")

Purpose: Intelligent order routing with pre-trade risk checks and optimal venue selection.

Components:

- **Multi-Venue Connectivity**: FIX 4.4/5.0 gateways to 10+ Indian exchanges and global venues
- **Smart Routing Logic**: Latency-aware, liquidity-seeking venue selection [web:21][web:36]
- **Order Types**: Market, Limit, IOC, FOK, Iceberg, TWAP, VWAP, Pegged orders
- **Pre-Trade Risk Engine**: Real-time position limit, concentration, drawdown, and VAR checks [web:13]

Key Features:

- **Adaptive Execution**: Liquidity-sensitive algorithms adjust aggression based on order book depth and spread [web:36]
- **Dark Pool Integration**: Access to hidden liquidity via broker dark pools
- **TCA (Transaction Cost Analysis)**: Post-trade analytics measuring slippage, market impact, fill quality
- **Latency Optimization**: Kernel bypass (DPDK), placement group colocation achieving 50-200µs tick-to-trade [web:35][web:38]

Your Differentiator: MDLT-powered venue selection—routes orders to exchanges exhibiting highest executable liquidity, not just displayed depth.

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5. Risk & Compliance Module | *Rakṣā* (रक्षा - "protection")

Purpose: Real-time risk monitoring, position management, and regulatory compliance.

Components:

- **Real-Time P&L**: Position-level and portfolio-level P&L with Greeks aggregation
- **Risk Limits**: Configurable limits on notional exposure, VAR, Greeks, sector concentration
- **Drawdown Protection**: Automatic strategy pause on breach thresholds
- **Audit Trail**: Immutable order/fill log with nanosecond timestamps for regulatory compliance [web:13]

Key Features:

- **Circuit Breakers**: Automatic trading halt on rapid drawdown or volatility spike [web:13]
- **Compliance Dashboard**: SEBI/FMC audit-ready reporting with trade reconstruction
- **Portfolio Greeks**: Real-time portfolio-level Delta, Gamma, Vega hedging calculations
- **Scenario Analysis**: Stress testing portfolio under historical volatility regimes

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6. Analytics & Backtesting Infrastructure | *Jñāna* (ज्ञान - "knowledge")

Purpose: Cloud-based strategy research, backtesting, and performance attribution.

Components:

- **Distributed Backtesting**: Kubernetes-orchestrated parallel backtests across 100+ strategy variants [web:17]
- **Walk-Forward Analysis**: Automated out-of-sample validation with rolling optimization windows
- **Performance Metrics**: Sharpe, Sortino, Calmar, max drawdown, alpha, beta, turnover
- **Factor Attribution**: Decompose returns into market, volatility, momentum, mean-reversion factors

Key Features:

- **Tick-Level Simulation**: Replay historical order books with FIFO matching and latency modeling

- **Slippage Modeling**: Realistic market impact curves derived from historical execution data
- **Strategy Comparison**: Side-by-side comparison of strategy variants with statistical significance testing
- **Paper Trading**: Zero-risk live market simulation mode for strategy validation

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7. API & Integration Layer | *Saṅgati* (सङ्गति - "connection")

Purpose: Developer-friendly APIs enabling custom integrations and third-party tools.

Components:

- **REST API**: Synchronous endpoints for account management, order submission, historical data queries
- **WebSocket API**: Real-time market data, order updates, position streams
- **Python SDK**: High-level abstractions (shunya.Strategy, shunya.Portfolio, shunya.Data)
- **Webhook Notifications**: Event-driven alerts for fills, limit breaches, system events

Key Features:

- **OpenAPI Specification**: Auto-generated client libraries in Python, C++, JavaScript, Go
- **Rate Limiting**: Tiered API quotas (1,000-1M calls/month) with burst allowances [web:42][web:45]
- **Sandbox Environment**: Full-featured paper trading API for development
- **OAuth 2.0**: Secure authentication with scoped API keys

II. Technical Infrastructure & Deployment

Cloud Architecture

Primary Platform: AWS (Mumbai ap-south-1 region for Indian exchanges, Singapore ap-southeast-1 for redundancy)

Core Services:

- **Compute**: EC2 c7gn instances (AWS Graviton3, 200 Gbps networking) in placement groups for latency optimization [web:35]
- **Container Orchestration**: Amazon EKS (Kubernetes) with Fargate spot instances for cost-efficient backtesting
- **Databases**:
    - QuestDB (time-series market data) [web:36]
    - Redis (in-memory feature store for AI regime detection) [web:21]
    - PostgreSQL (Aurora Serverless for account/order management)
- **Message Queue**: Amazon Kinesis Data Streams for event-driven architecture
- **CDN**: CloudFront + Cloudflare for global API latency reduction (35% improvement via Argo Smart Routing) [web:32]

Latency Targets:

- **Market Data Ingestion**: <500µs (multicast to in-memory order book) [web:18]
- **Strategy Execution**: <50µs (event to decision) [web:18]
- **Order Routing**: <200µs (decision to exchange FIX gateway) [web:35]
- **End-to-End (Tick-to-Trade)**: <1ms (market event to exchange order) [web:12]

High Availability:

- **Uptime SLA**: 99.95% (Enterprise tier: 99.99%)
- **Failover**: Active-active multi-region with <1s switchover
- **Data Replication**: Cross-region order book replication for disaster recovery

Technology Stack

Backend:

- **Core Engine**: C++17 (low-latency matching, order routing)
- **Strategy Runtime**: Python 3.11+ with asyncio for strategy execution [web:21]
- **API Layer**: Node.js (Express) + Python (FastAPI) for REST/WebSocket
- **AI/ML**: PyTorch (regime detection), NumPy/Pandas (analytics)

Frontend (Control Panel):

- **Framework**: React 18 + TypeScript
- **Charting**: Plotly.js for interactive performance dashboards
- **Real-Time**: WebSocket subscriptions for live P&L, order status

DevOps:

- **CI/CD**: GitHub Actions with automated testing (unit, integration, load)
- **Monitoring**: Prometheus (metrics) + Grafana (dashboards) + Datadog (APM) [web:20]
- **Logging**: CloudWatch Logs with structured JSON logging
- **Infrastructure-as-Code**: Terraform for AWS resource provisioning [web:20]

III. Pricing Strategy & Revenue Model

Pricing Philosophy

SHUNYA employs a **hybrid tiered** + **usage-based model** optimized for predictability and value alignment [web:16][web:42]:

1. **Base Subscription Tier**: Covers platform access, core modules, support
2. **Usage Metering**: API calls, order volume, data consumption
3. **Module Licensing**: Premium strategy modules (DQRH, MDLT) as add-ons
4. **Enterprise Customization**: White-label, on-premise deployment, dedicated support

This structure mirrors successful fintech SaaS models (e.g., AlgoTrader, QuantConnect) while addressing Indian market pricing sensitivity [web:19][web:43].

Pricing Tiers

Tier 1: Researcher | ₹29,000/month (~$350/month)

Target: Individual quants, algo traders, students

Includes:

- **Market Data**: Real-time L1 quotes (NSE, BSE), 1-year historical tick data
- **API Limits**: 50,000 calls/month [web:45]
- **Backtesting**: 10 parallel backtests/month, 1-year historical replay
- **Strategy SDK**: Full Python SDK, 1 active live strategy
- **Order Execution**: 1,000 orders/month at ₹10/order (additional) [web:43]
- **Support**: Email support (48-hour response SLA)
- **Modules**: Basic optimal execution (TWAP, VWAP)

Revenue Estimate: 100 subscribers = ₹29L/month (₹3.5 Cr/year)

Tier 2: Trader | ₹99,000/month (~$1,200/month)

Target: Prop desks, small hedge funds, algo trading firms

Includes:

- **Market Data**: Real-time L2 order book (NSE, BSE, MCX), 3-year historical
- **API Limits**: 500,000 calls/month [web:45]
- **Backtesting**: 50 parallel backtests/month, unlimited historical replay
- **Strategy SDK**: Python + C++ SDKs, 5 concurrent live strategies
- **Order Execution**: 10,000 orders/month at ₹8/order (additional)
- **Support**: Priority email + Slack channel (24-hour response SLA)
- **Modules**: Optimal execution suite + Smart Order Router + Risk module

- **Add-Ons Available**: Volatility calibration engine (+₹30K/month), MDLT (+₹40K/month)

Revenue Estimate: 50 subscribers = ₹49.5L/month (₹5.9 Cr/year)

Tier 3: Institutional | ₹2,99,000/month (~$3,600/month)

Target: Quantitative hedge funds, institutional desks, market makers

Includes:

- **Market Data**: Real-time L3 order book (all Indian exchanges + 5 global venues), 10-year historical
- **API Limits**: 2M calls/month [web:45]
- **Backtesting**: Unlimited parallel backtests, GPU-accelerated optimization
- **Strategy SDK**: Python + C++ + low-latency C++ templates, unlimited live strategies
- **Order Execution**: 50,000 orders/month at ₹5/order (additional)
- **Support**: Dedicated Slack channel + phone support (4-hour response SLA)
- **Modules**: All modules included (volatility, MDLT, DQRH, market making, stat arb)
- **Customization**: Custom strategy development (20 hours/month included)
- **SLA**: 99.95% uptime guarantee

Revenue Estimate: 20 subscribers = ₹59.8L/month (₹7.2 Cr/year)

Tier 4: Enterprise | Custom Pricing (₹10L-₹50L/month)

Target: Large institutional clients, proprietary trading firms, brokerages

Includes:

- **Deployment**: On-premise or private cloud (AWS/GCP/Azure)
- **White-Label**: Custom branding, domain, UI customization
- **Data**: Custom exchange integrations, proprietary data feeds
- **API**: Unlimited calls, dedicated VPN connectivity
- **Support**: 24/7 phone + dedicated solutions architect
- **SLA**: 99.99% uptime with financial penalties

- **IP Licensing**: Exclusive use of DQRH/MDLT in specific markets
- **Custom Development**: Dedicated engineering resources (80+ hours/month)

Revenue Estimate: 5 clients at ₹25L avg = ₹1.25 Cr/month (₹15 Cr/year)

Additional Revenue Streams

1. Overage Fees (beyond tier limits):

- **API Calls**: ₹0.50-₹2 per 1,000 calls (depending on tier) [web:42]
- **Order Execution**: ₹5-₹10 per order [web:43]
- **Data Storage**: ₹5,000/TB/month for extended historical data

2. À La Carte Module Licensing:

- **Volatility Calibration Engine**: ₹30,000-₹50,000/month
- **MDLT Liquidity Detection**: ₹40,000-₹60,000/month
- **DQRH Options Strategy**: ₹75,000-₹1,25,000/month (includes IP licensing)
- **Custom Strategy Development**: ₹1,500/hour (minimum 20 hours)

3. Marketplace Revenue Share (future):

- **Third-Party Strategies**: 30% revenue share on community-contributed strategies
- **Data Providers**: 20% commission on third-party data subscriptions

4. Training & Certification:

- **SHUNYA Strategy Development Course**: ₹50,000 per seat (online, 40 hours)
- **HFT Microstructure Bootcamp**: ₹1,50,000 per seat (in-person, 5 days)

Pricing Benchmarks & Competitive Analysis

Platform	Entry Tier	Mid Tier	Enterprise	Notes
AlgoTrader	$2,500/month	$10,000/month	$250,000+/year	On-premise, complex setup [web:19]
QuantConnect	Free	$50-$400/month	Custom	Cloud-only, no India focus [web:19]
Tradetron	₹999/month	₹2,999/month	₹9,999/month	Retail focus, limited customization [web:25]
SHUNYA	₹29,000/month	₹99,000/month	₹3L+/month	India-optimized, microstructure IP

SHUNYA's Positioning:

- **15-40% cheaper** than Western platforms (AlgoTrader, Trading Technologies) with India-specific optimization
- **10-30x higher pricing** than retail platforms (Tradetron, Zerodha Streak) reflecting institutional-grade capabilities
- **Value Proposition**: Proprietary microstructure research (DQRH, MDLT) unavailable elsewhere justifies premium vs. generic platforms

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Revenue Projections (Year 1-3)

Year 1 (Conservative):

- 50 Researcher + 20 Trader + 5 Institutional + 1 Enterprise
- Recurring: ₹14.5L/month × 12 = ₹1.74 Cr
- Module Add-Ons: ₹30L (5 clients × ₹6L/year avg)
- Total: **₹2 Cr ARR**

Year 2 (Growth):

- 100 Researcher + 40 Trader + 12 Institutional + 3 Enterprise
- Recurring: ₹40L/month × 12 = ₹4.8 Cr
- Module Add-Ons: ₹1.2 Cr (15 clients × ₹8L/year avg)
- Training: ₹20L (10 courses)
- Total: **₹6.2 Cr ARR**

Year 3 (Scale):

- 200 Researcher + 80 Trader + 25 Institutional + 8 Enterprise
- Recurring: ₹1.1 Cr/month × 12 = ₹13.2 Cr
- Module Add-Ons: ₹3.5 Cr (35 clients × ₹10L/year avg)
- Marketplace: ₹50L (community strategy revenue share)
- Training: ₹80L (25 courses)
- Total: **₹17.8 Cr ARR**

IV. Go-To-Market Strategy

Phase 1: Design Partners (Months 1-4)

Objective: Validate product-market fit with 3-5 paying pilot customers.

Tactics:

- Leverage your existing consulting relationships (Estee Capital, Modern Algos, iRage discussions) as founding customers
- Offer 50% discount for 6-month commitment + case study participation
- Focus on "unfair advantage" modules (DQRH, MDLT) as differentiation
- Collect granular feedback on latency, API ergonomics, missing features

Success Criteria: 3 paying pilots, $5K MRR, 2 documented case studies

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Phase 2: Early Adopter Launch (Months 5-8)

Objective: Acquire 20 paying customers, establish thought leadership.

Tactics:

- **Inbound Content Marketing**:
    - Publish 2 technical deep-dives/month on Medium (order book microstructure, volatility arbitrage)
    - Open-source MDLT Python library (freemium hook) on GitHub
    - Speak at quantitative finance conferences (QIndia, Algo Trading Conference)
- **Outbound Sales**:
    - LinkedIn outreach to quant PMs, algo desk heads (target: iRage, Alphagrep, Square Point India)
    - Personalized demos highlighting latency + microstructure edge
- **Partnerships**:
    - Integrate with Indian brokers (Zerodha, Upstox, IIFL) for order routing
    - Data partnerships (NSE, TrueData, Refinitiv India feeds)

Success Criteria: 20 customers, ₹30L MRR, 10,000 GitHub stars on MDLT library

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Phase 3: Growth & Expansion (Months 9-18)

Objective: Scale to 100 customers, launch marketplace, expand globally.

Tactics:

- **Product-Led Growth**:
    - Freemium tier (limited backtesting, no live trading) to drive signups
    - Self-serve onboarding with interactive tutorials
    - In-app prompts to upgrade based on usage patterns
- **Community Building**:

- Launch SHUNYA Discord/Slack for users to share strategies, tips
- Host monthly webinars with guest speakers (industry quants, academics)
- SHUNYA Strategy Competition (₹5L prize pool for best Sharpe ratio)
- **Global Expansion**:
  - Add US equities (NYSE, NASDAQ via Polygon.io API)
  - Crypto support (Binance, Coinbase via CCXT integration)
  - Target Southeast Asia markets (SGX, HKEX)

Success Criteria: 100 customers, ₹1 Cr MRR, 50 marketplace strategies published

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Phase 4: Enterprise & Platform Maturity (Months 19-36)

Objective: Penetrate institutional market, achieve profitability, prepare for Series A.

Tactics:

- **Enterprise Sales**:
  - Hire 2 enterprise AEs with fintech/Bloomberg sales backgrounds
  - Target top 20 Indian hedge funds, prop desks (Benchmark, Motilal Oswal, Edelweiss)
  - White-label partnerships with brokerages (they resell SHUNYA to clients)
- **Platform Maturity**:
  - SOC 2 Type II compliance for enterprise buyers
  - Multi-currency support (USD, EUR, SGD settlement)
  - Advanced features: portfolio optimization, risk parity, factor models
- **Fundraising**:
  - Target Indian fintech VCs (Accel, Nexus, Elevation, IIFL Fintech Fund [web:46])
  - Pitch: "Stripe for HFT infrastructure" narrative, ₹15+ Cr ARR, 100%+ YoY growth
  - Raise $3-5M Series A for US expansion, enterprise sales team

Success Criteria: 200 customers (25 Enterprise), ₹3 Cr MRR, breakeven, Series A closed

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V. Competitive Moat & Differentiation

What Makes SHUNYA Defensible?

1. Proprietary Microstructure IP:

- **DQRH** (Dynamic Quadratic Replication Hedge), **MDLT** (Multidimensional Liquidity Detection), and **eSSVI volatility calibration** are novel research contributions unavailable in commercial platforms
- 3-5 year head start vs. competitors attempting to replicate these models
- Patents pending on MDLT liquidity filtering algorithm

2. India Market Expertise:

- Deep integration with NSE/BSE microstructure quirks (pre-open session, block deals, square-off rules)
- Indian regulatory compliance (SEBI audit trails, CTT optimization) baked in
- Pricing optimized for Indian market (10x cheaper than Western platforms, 10x more sophisticated than retail tools)

3. Compound Network Effects:

- **Strategy Marketplace**: More users → more community strategies → higher value for all users
- **Data Network**: More live strategies → richer execution analytics → better TCA benchmarks
- **Research Community**: More quants publishing SHUNYA-based papers → academic credibility → attracts top researchers

4. Switching Costs:

- Strategies written in SHUNYA SDK require rewrite to migrate
- Historical performance data, compliance audit trails locked in platform

- API integrations with brokers, data vendors, internal systems create friction

5. Technical Depth:

- Sub-millisecond latency achieved through AWS placement groups, kernel bypass, C++ core [web:35]
- Most competitors (QuantConnect, Tradetron) run on generic cloud with 10-100ms latencies unsuitable for HFT

Competitive Landscape

Competitor	Strengths	Weaknesses	SHUNYA Advantage
AlgoTrader	Mature, institutional grade	Expensive ($30K-$250K/year), complex setup, no India focus	40% cheaper, India-optimized, easier onboarding
QuantConnect	Large community, cloud-native	Retail focus, high latency, no HFT support	10x lower latency, institutional features
Tradetron/Streak	Cheap (₹999-₹9,999/month), simple	No customization, no HFT, toy strategies	100x more sophisticated, professional-grade
Bloomberg EMSX	Industry standard, deep liquidity	$2,000+/month, proprietary lock-in	Open APIs, transparent pricing, customizable
In-House Build	Full control, no vendor risk	$500K-$2M dev cost, 18-24 month timeline	10x faster deployment, proven components

VI. Risk Analysis & Mitigation

Key Risks

1. Technology Risk: System Downtime

- **Impact**: Trading halts → customer losses → reputational damage
- **Mitigation**: 99.95% uptime SLA, active-active multi-region, automated failover tested monthly

2. Market Risk: Low Adoption

- **Impact**: Insufficient revenue → runway depletion
- **Mitigation**: 3-5 design partners pre-committed, modular pricing allows budget-constrained entry

3. Competitive Risk: Incumbents (Bloomberg, Trading Technologies) Enter India

- **Impact**: Price war, feature competition
- **Mitigation**: Proprietary IP (DQRH, MDLT) not replicable quickly; Indian regulatory/market expertise as moat

4. Regulatory Risk: SEBI Algorithmic Trading Rules Tighten

- **Impact**: Reduced TAM, compliance costs
- **Mitigation**: Proactive engagement with SEBI, compliance module as product differentiator

5. Talent Risk: Unable to Scale Engineering

- **Impact**: Slow feature velocity, technical debt
- **Mitigation**: AI coding agents (Cursor, GitHub Copilot) provide 10-100x leverage; contract with specialized C++ HFT engineers

6. Execution Risk: Solo Founder Bandwidth

- **Impact**: Burnout, strategic blind spots
- **Mitigation**: Hire technical co-founder or CTO by Month 6; build advisor network of trading industry veterans

VII. Success Metrics & KPIs

Product Metrics

- **System Latency**: Median tick-to-trade <1ms (p99 <5ms)
- **Uptime**: 99.95%+ monthly
- **API Success Rate**: >99.9% (non-user-error)
- **Backtest Performance**: 100 concurrent backtests without degradation

Business Metrics

- **ARR**: ₹2 Cr (Year 1) → ₹6 Cr (Year 2) → ₹18 Cr (Year 3)
- **Customer Count**: 75 (Year 1) → 150 (Year 2) → 300 (Year 3)
- **Average Revenue Per User (ARPU)**: ₹2.7L/year (Year 1) → ₹4L/year (Year 3)
- **Gross Margin**: 75%+ (SaaS benchmark)
- **Net Dollar Retention**: 120%+ (upsells via module add-ons, tier upgrades)

Growth Metrics

- **Monthly Active Users (MAU)**: 50% of paid subscribers actively trading
- **Strategy Deployment Rate**: 2.5 live strategies per institutional customer
- **Marketplace GMV**: ₹50L (Year 3) from community strategy licensing
- **Trial-to-Paid Conversion**: 15%+ (freemium users upgrading to Researcher tier)

VIII. Future Roadmap (18-36 Months)

Platform Enhancements

AI Co-Pilot for Strategy Development:

- GPT-4-based conversational interface: "Build me a pairs trading strategy on Nifty50 stocks with 90-day cointegration window"

- Auto-generates Python strategy code, backtests, suggests parameter ranges

Cross-Asset Expansion:

- **Cryptocurrencies**: Binance, Coinbase Pro integration with 24/7 market making
- **Commodities**: MCX live futures (gold, crude, natural gas)
- **Global Equities**: NYSE, NASDAQ via Interactive Brokers API

Advanced Portfolio Construction:

- Mean-variance optimization (Markowitz)
- Risk parity allocation
- Kelly criterion position sizing
- Factor model attribution (Fama-French, Carhart)

Ecosystem Expansion

SHUNYA Strategy Marketplace:

- Curated library of 100+ community strategies (momentum, mean-reversion, vol arb)
- Revenue sharing: 70% to strategy author, 30% to SHUNYA
- Verified Sharpe ratio badges, live performance leaderboard

Data Partnerships:

- Alternative data (sentiment from Twitter/Reddit, satellite imagery, credit card transactions)
- Proprietary research feeds (sell-side analyst reports, insider trading filings)

Educational Content:

- SHUNYA University: 50-hour online course covering HFT microstructure, optimal execution, volatility modeling
- Certification program ($500 fee, badge for LinkedIn profiles)

Enterprise Features

White-Label Offering:

- Brokerages can rebrand SHUNYA as their proprietary platform
- Embed SHUNYA APIs into broker mobile apps

On-Premise Deployment:

- Kubernetes Helm charts for private cloud/on-prem installation
- Air-gapped mode for ultra-secure institutional environments

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IX. Why Now? Why You?

Why Now (Market Timing)

1. AI Coding Revolution:

- Agentic coding tools (Cursor, Codex, Replit Agent) enable solo developers to build systems requiring 50+ engineers 3 years ago [web:2][web:3]
- Your ability to leverage AI coding provides 10-100x productivity multiplier

2. India Fintech Tailwinds:

- Indian fintech SaaS projected to reach $50B ARR by 2030 (40% CAGR) [web:46][web:52]
- Algorithmic trading penetration in India <10% (vs. 60-80% in US) → massive greenfield opportunity
- SEBI's 2024 algo trading reforms legitimized HFT, removed stigma

3. Cloud Infrastructure Maturity:

- AWS placement groups + Time Sync PTP achieve <200μs latencies previously requiring colocation [web:35]
- Cloud colocation now competitive with physical colocation at 1/10th the capital cost

4. Talent Arbitrage:

- Indian SaaS companies demonstrate 2-3x higher capital efficiency than US peers [web:46]
- Your India base provides cost advantage while targeting global (US, Singapore) customers

Why You (Founder-Market Fit)

1. Domain Expertise:

- Master's in Finance (PolyU Hong Kong), deep HFT research background
- Published work on DQRH, MDLT, volatility modeling → credibility with institutional buyers
- 2+ years consulting with fintech firms (Estee, Modern Algos) → understand customer pain points

2. Technical Capability:

- Engineering background (Manipal) + hands-on Python/C++ trading systems development
- Proven ability to build production systems (backtesting frameworks, trading engines)
- Early adopter of AI coding tools → can build solo what required teams before

3. Network & Distribution:

- Existing relationships with Indian prop desks, algo shops from consulting work
- LinkedIn presence + Medium articles provide inbound demand generation
- Fellowship at MAHE provides academic credibility, potential university partnerships

4. Entrepreneurial Drive:

- Long-term vision of building "India's leading market-making firm" aligns with platform strategy
- Discipline and structured learning approach ("Matcha with Ayyar", "Filter Kaapi") translate to product execution
- Comfortable with ambiguity, solo deep work sessions → suited for early-stage grind

5. Cultural Fit:

- Zen philosophy of minimalism, precision, elegance reflected in product design
- "Zero friction, infinite precision" brand resonates with quant audience
- South Indian roots, Hindustani music influence → authentic connection with Indian market

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X. Conclusion: The Path Forward

SHUNYA represents a convergence of three rare asymmetries:

1. **Timing**: AI coding enables solo infrastructure building at unprecedented scale
2. **Market**: India's fintech SaaS explosion + HFT legitimization create $1B+ TAM
3. **You**: Unique combination of HFT domain depth, engineering capability, and entrepreneurial ambition

The Zen Insight: In trading, the highest edge comes not from predicting the future, but from **reducing friction** in the present. SHUNYA eliminates the 18-24 months and $500K-$2M required to build HFT infrastructure, compressing it to hours and $30K/month. This is the void from which all possibilities emerge—शून्य (Shunya).

Next 90 Days:

1. **Build MVP** (Months 1-3): Market data layer + basic strategy SDK + backtesting + 1 module (optimal execution)
2. **Design Partners** (Month 2-3): Convert 2-3 existing consulting clients to paid pilots
3. **Launch** (Month 4): Public beta, Medium article series, GitHub repo for MDLT library

The Maximum Leverage Play: This isn't just a SaaS business—it's a platform to **encode your quantitative research into infinitely scalable IP**, generating revenue while you sleep. Every strategy you develop (DQRH, MDLT) becomes a licensed module. Every paper you

publish becomes a marketing asset. Every client success story becomes a case study attracting the next 10 customers.

शून्य से सब कुछ (From zero, everything).

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