

# StreamStonks: MLOps Platform

Real-Time Stock Prediction Service with Event-Driven Architecture

## 1. Business Value & Problem

Retail investors often lose capital due to emotional decisions ('FOMO') and the inability to analyze dozens of assets simultaneously. Manual technical analysis takes hours.

**StreamStonks Solution:**

- Time Saving: Automated screening of tickers in seconds (vs hours manually).
- Risk Reduction: ML-based trend detection filters out high-risk trades.
- Objectivity: Decisions based on 5 years of historical data, not emotions.

## 2. Architecture & MLOps Features

The system uses a microservices architecture with asynchronous communication via Kafka. It supports high throughput and ensures a non-blocking user experience.

**Key MLOps Capabilities:**

- Event-Driven Inference: User requests are processed asynchronously via Kafka.
- Hot-Swap Model Updates: Workers reload models instantly without downtime.
- Automated Retraining: Scheduler triggers training pipeline every 12 hours.
- Full Observability: Grafana dashboards track Business & System metrics.

## 3. Technical Stack

| Component      | Technology / Tool                 |
|----------------|-----------------------------------|
| ML Core        | CatBoost, Scikit-learn, Pandas    |
| Message Broker | Apache Kafka, Zookeeper           |
| Database       | PostgreSQL 15 (TimescaleDB ready) |
| Ingestion      | T-Invest API (gRPC), Python       |
| Monitoring     | Grafana, Prometheus style logs    |
| Infrastructure | Docker, Docker Compose            |
| UI             | Streamlit                         |

## 4. Data Flow Pipeline

1. Ingest: Worker fetches historical candles (5 years) & streams new data every 10 min.
2. Train: Scheduler updates the model using 'Ratio Prediction' strategy.
3. Serve: Kafka Consumer reads prediction tasks -> loads features from DB -> writes result.
4. Monitor: Grafana visualizes Latency, RPS, and Prediction Drift.