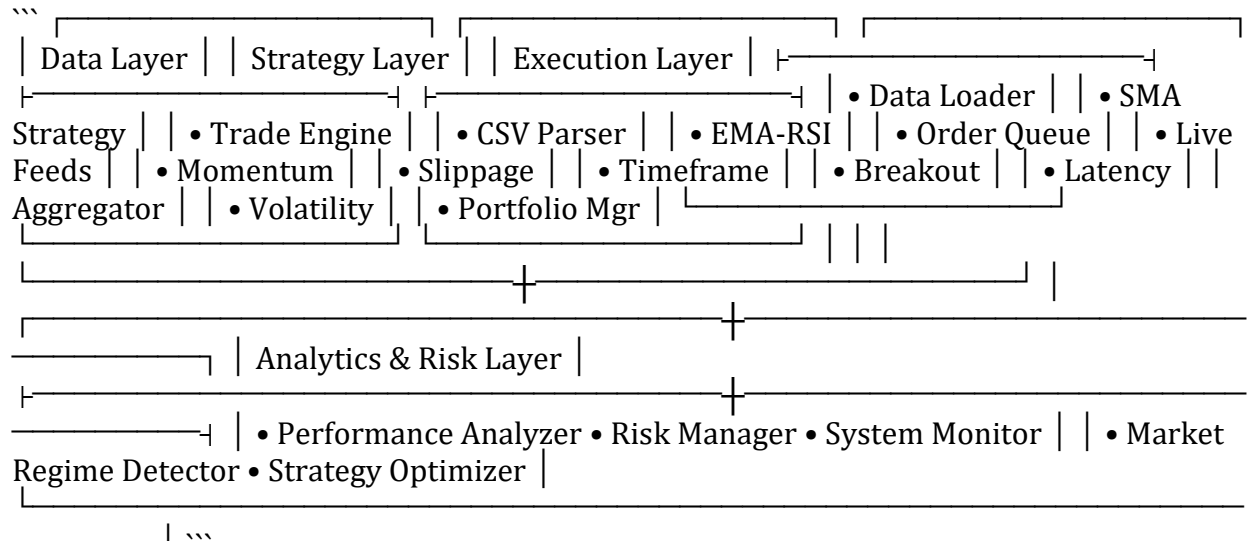# TradePulse - Live Strategy Backtester

Overview

TradePulse is a high-performance Live-to-Test Strategy Pipeline that enables seamless development, backtesting, and deployment of trading strategies. The system provides a comprehensive framework for strategy development, rigorous backtesting with realistic market conditions, and real-time performance tracking in a live shadow environment.

Key Features

- **High-Performance Backtesting Engine**: Event-driven simulation with realistic market conditions
- **Live Shadow Environment**: Real-time strategy execution without capital risk
- **Multi-Asset Support**: Trade across multiple cryptocurrency pairs simultaneously
- **Advanced Risk Management**: Real-time position monitoring and risk controls
- **Strategy Optimization**: Parameter optimization with walk-forward analysis
- **Market Regime Detection**: Adaptive strategies based on market conditions
- **Comprehensive Analytics**: Performance attribution and risk metrics

System Architecture

```
┌─────────────────┐  ┌─────────────────┐  ┌─────────────────────────────┐
│ Data Layer      │  │ Strategy Layer  │  │ Execution Layer │ ┌─────────────────────┐
├─────────────────┤  ├─────────────────────────┤  │ • Data Loader │ │ • SMA
Strategy │ │ • Trade Engine │ │ • CSV Parser │ │ • EMA-RSI │ │ • Order Queue │ │ • Live
Feeds │ │ • Momentum │ │ • Slippage │ │ • Timeframe │ │ • Breakout │ │ • Latency │ │
Aggregator │ │ • Volatility │ │ • Portfolio Mgr │
                                                    │ │ │
└──────────────────────────────────────────────────┤ │
┌───────────────────────────────────────────────────┤
│        ┌─────────────────────┐                     │
├────────────────┤ │ Analytics & Risk Layer │        │
├───────────────────────────────────────────────────┤
├────────────────┤ │ • Performance Analyzer • Risk Manager • System Monitor │ │ • Market
Regime Detector • Strategy Optimizer │
└───────────────────────────────────────────────────┘
└────────────────┘ ```
```

Quick Start

Prerequisites

- C++17 or higher
- CMake 3.10+
- Python 3.7+ (for analysis scripts)

Build Instructions

```bash
# Clone and build
mkdir build && cd build
cmake ..
make
```

Run backtesting

./tradepulse

For live shadow trading

```
python3 scripts/binance_stream.py 1 # Start BTC data stream
./tradepulse # Select live shadow mode
```

Supported Strategies
1. **SMA Strategy**: Simple Moving Average crossover with aggressive parameters
2. **EMA-RSI Strategy**: Exponential Moving Average with RSI confirmation
3. **Momentum Strategy**: Price momentum with volume confirmation
4. **Breakout Strategy**: High/low breakout with volume and ATR filters
5. **Volatility Expansion**: ATR-based volatility breakout strategy

Performance Metrics

The system tracks comprehensive performance metrics:

- **Return Metrics**: Total return, Sharpe ratio, Sortino ratio

- **Risk Metrics**: Maximum drawdown, VaR, volatility

- **Trade Metrics**: Win rate, profit factor, average trade duration

- **System Metrics**: Processing speed, latency, resource usage

Directory Structure

```
tradepulse/
├── src/ # Core C++ source files
├── include/ # Header files
├── scripts/ # Python analysis scripts
├── data/ # Historical market data
├── logs/ # Trade logs and debug files
├── reports/ # Generated HTML reports
├── plots/ # Performance charts
└── docs/ # Documentation
```

License

This project is developed for the GoQuant recruitment process. ```