

CHRIS COLEMAN

QUANTITATIVE TRADING SYSTEMS DEVELOPER

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SUMMARY

Quantitative developer who builds systematic options trading systems end to end: tick-level market-data capture, multi-billion-row research stores, backtest and execution-simulation engines, large-scale hyperparameter search, machine-learning and evolutionary tuners held to strict walk-forward validation, and live IBKR trading bots audited against their own backtests order for order. Python-first (NumPy, Polars, Numba, PyTorch/CUDA), fluent in C and C++, and backed by fifteen years as an API and technical documentation specialist, so every system ships with a precise specification, a test suite that guards its assumptions, and a written record of every result.

TECHNICAL SKILLS

- **Languages:** Python, C, C++, SQL, Bash; JavaScript/HTML for analytical front ends
- **Optimization & ML:** PyTorch (CUDA GPU training, deep ensembles), Optuna/Bayesian TPE, genetic algorithms, particle swarm optimization, CMA-ES, ridge and MLP models, meta-learning over model portfolios
- **Validation & Statistics:** nightly walk-forward refits, in-sample vs. out-of-sample haircut, permutation and shuffled-panel nulls, block bootstrap, deflated Sharpe, drawdown stress metrics, lookahead guards, differential testing
- **Data & Performance:** Polars, Pandas, NumPy, Numba, Parquet/Arrow, DuckDB, multiprocessing, lossless tick-store compression
- **Trading Systems:** IBKR TWS API (ib_async, asyncio), ThetaData, native/resting order types and OCA groups, multi-leg combo orders, position reconciliation, slippage/venue/commission measurement
- **Visualization & UI:** Plotly 3D surfaces, interactive HTML dashboards with a local control server, PyQt, Textual TUIs, lightweight-charts

WORK EXPERIENCE

Quantitative Trading Systems Developer

Oct 2021 – Present

Independent Contractor

Design and build a full research-to-execution stack for ODTE SPX/SPXW index options: data capture, research datasets, backtesting, strategy tuning, live execution, and execution-cost measurement.

- Built a composable backtest engine that prices every order against true tick NBBO with an exact commission model and a fill guard that raises, never clamps, whenever a simulated fill leaves the book or precedes its trigger.
- Ran hyperparameter sweeps of **100M+ trials**, writing the full per-session × per-config matrix to Parquet so every re-score is arithmetic instead of a re-run; Numba kernels score a policy book in under 1 ms, and per-session caching cut a nightly model refit from **46 minutes to 16 seconds**.
- Built a fleet of strategy tuners — genetic algorithms, particle swarm, CMA-ES, Bayesian TPE, ridge/MLP, and a 16-network PyTorch deep ensemble trained on GPU — plus meta-agents that select among them using only their out-of-sample forward records, including a self-training gate with persistent memory.
- Set the validation protocol for every fitted rule: nightly walk-forward refit against a frozen baseline, reporting in-sample, walk-forward, paired gain, Sharpe, max drawdown and a worst-ordering drawdown cascade. It caught a 77M-trial optimum that beat the baseline by **\$702/session in sample but trailed it by \$165 walking forward**, before it could be deployed.
- Shipped live IBKR bots that import the same rule module as the backtest, with resting native orders, fill-driven order chains, crash-safe ledgers and a paper-account guard; a differential test replays 45 real sessions through live and backtest code and requires **identical orders, with no tolerance**.
- Automated CME futures and FX options RFQ workflows and locally managed multi-leg exits.
- Maintain a 1,600+ test suite and a living research record of 190+ numbered findings and standing rules, including the negative results that keep settled questions from being re-run.

Contractor (S&P Global, Vanguard, PayPal, 2K Games, et al.)

- Wrote API references, developer guides and integration specifications for enterprise financial and technology clients, working directly from source code, endpoints and engineering SMEs.
- Built automation software suites in **Python and C++** for media post-production, including tools that converted subtitle formats into structured, timecoded dialog lists for global localization teams on the NBA 2K series.
- Documented derivatives products, market microstructure and quantitative trading strategies for retail and institutional audiences; FINRA SIE certified.
- Produced regulated documentation under financial-compliance and FDA review workflows for clients including S&P Global, Vanguard, PayPal, Terumo, Abbott and the Milken Institute.

SELECTED PROJECTS

Strategy Tuner Fleet & Referee Dashboard · *Python, PyTorch, Numba, Plotly*

- Interactive HTML dashboard drawing every book's 1,260-config parameter surface in **3D and flat** for any metric, with two knobs on the axes and the rest on sliders, split-half reproducibility scatter, and walk-forward equity and drawdown for every tuner run.
- A localhost server lets the user **freeze or unfreeze a tuner's config from the page**; frozen configs are re-verified nightly, scored on every later session, and **trade live as shadow books** beside the production bot.
- One nightly pipeline ingests the day's capture, rebuilds the tick-level book, refits every agent in parallel worker processes and republishes the dashboard, stopping at the first failure.

NBBO Market-Data Capture · *IBKR, asyncio, Parquet*

- Captures the full SPXW ODTE quote book (~100 ms per leg) plus SPX prints and 1-minute bars from IBKR all session, sharded every minute, resumable, and compacted into a store whose 13 columns, Arrow types and timezone are asserted identical to the vendor (ThetaData) store, so every existing pipeline reads it unchanged.

SSLIP Execution-Cost Logger · *IBKR, live paper trading*

- Runs six order mechanisms (market, limit, peg-to-mid; resting vs. locally watched exits) on the same strikes at the same instants, all session, including the opening rotation and the final minute. Across 600+ filled legs it measured CBOE vs. IBKR-internalized commission tiers to the cent and a statistically significant fill improvement from internalized peg routing ($t \approx 9$).

Lossless Tick Store · *Polars, Parquet*

- Compressed 148 sessions of true-tick NBBO from **99.3 GB / 22.4B rows to 20.2 GB / 5.3B rows** (4.9×) with a deduplication proven to reconstruct the source exactly on every session, after showing that the proposed time-bucketed alternative would have silently broken the latency and resting-order fill models.

EDUCATION & CREDENTIALS

University of Southern California — *M.F.A., Media Production*

William & Mary — *B.A., Semiotics, Magna Cum Laude; Minors: Applied Mathematics, Japanese*

FINRA Securities Industry Essentials (SIE), 2023 | **Languages:** English (native), Japanese (professional working proficiency)