

SEUNGMIN HAN

Systems Architect · Capital Markets · Low-Latency Trading Systems

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EDUCATION

University of Pennsylvania — School of Engineering & Applied Science · Philadelphia, PA

- **M.S.E., Computer & Information Science** — August 2023 – May 2024. Thesis: *Exploring Oblivious Pseudorandom Functions and their Applications*.
- **B.S.E., Computer & Information Science**, Minor in Mathematics — August 2017 – May 2023. GPA 3.64/4.00; Dean's List (2021–2023); CIS Senior Design "Most Technically Challenging" award.

PROFESSIONAL EXPERIENCE

Korea Investment Securities (한국투자증권) — Investment Engineering Dept. · Seoul September 2024 – Present
Market-Making / Liquidity-Provision (MM/LP) Systems Developer

- **Solely re-architected and fully rebuilt** the desk's MM/LP system covering **~5,500 instruments** (futures, options, ELW, ETN) — full-stack across the entire stack: from the backtesting database to a low-latency C++/C# back-end and a C# / DevExpress front-end.
- **Ported** the core order logic from Windows/C# to C++20 and applied CPU pinning, a busy-spin event loop, lock-free queues, and a pool allocator — **cutting tick-to-trade latency from 5 ms to ~25 μs (200x)**, verified with perf-based profiling.
- **Specced and validated** a network switch replacement and NIC kernel-parameter tuning with the infrastructure team, further cutting network-layer latency.
- **Implemented** quoting logic for options, basket, and single-stock futures/options arbitrage strategies with the quant-trading desk — including microprice-based fair-value pricing and real-time quote adjustment.

Supergate · Seoul May 2022 – August 2022
Software Engineer Intern

- Researched on Fully Homomorphic Encryption (FHE), which allows arbitrary computation on encrypted data
- Engineered the backend workflow and API to save and search encrypted data using C++ and MongoDB API
- Developed a C++ library for a searchable FHE database that supports private exact-match queries on encrypted data

Returning Software Engineer Intern May 2023 – August 2023

- Examined applications of FHE such as the HELib library API and state-of-the-art ciphertext comparison techniques
- Improved the searchable FHE database library to support efficient private query protocols and CRUD operations
- Applied for two patents on "FHE-based Encrypted Index" and "FHE-based PDQ Protocol" (South Korean Domestic Patent Application numbers 10-2023-0115045 and 10-2023-0115051)
- Implemented two novel private query protocols based on the patents that reduces query result size by 50% on average
- Cross compiled the server portion of the database library and other required sub-libraries on Zynq Xilinx FPGA board

University of Pennsylvania · Philadelphia, PA January 2022 – May 2024
Teaching Assistant → Head Teaching Assistant — CIS 5480 Operating Systems (graduate, ~250 students)

- Added **fuzz-style automatic edge-case generation** to the Python auto-grader, expanding test coverage across students' C operating-system implementations.
- Designed and taught a Linux-style OS capstone module (process scheduler and file system in C).
- Ran weekly code reviews of low-level C systems code (scheduling, virtual memory, syscalls) for graduate-level OS assignments.

Karrot (Daangn) · Korea June 2021 – September 2021
Global Technical Product Management Intern

- Drove **150% MAU growth** for the global marketplace app "Karrot" in the Toronto market.
- Built a real-time in-app user-behavior dashboard with BigQuery and Data Studio.
- Proposed a new consumer-penetration strategy via PMF (product-market-fit) analysis from prospective-user surveys.

Unbounded Research in Biomedical Systems Lab · USA May 2019 – September 2019
ML Research Assistant

- Implemented an ensemble of **three Relief-based ML algorithms** in scikit-learn, improving feature-selection / ranking speed by **150%** on large biomedical datasets.

SELECTED PROJECTS

Equity Research Web System — Python · multi-agent LLMs · self-hosted

- Built a local, self-hosted **multi-agent system that autonomously researches and scores equities** — parallel agents gather and cross-check multi-source data, and a multi-factor model outputs a defensible score and verdict per name, served through a web interface.
- Engineered a **self-audit loop**: independent agents adversarially re-check and re-grade each verdict, challenging weak or single-source claims before it is published.

Fully Secure Online Voting Platform using FHE — C++ · HELib · Senior Design, "Most Technically Challenging" award

- Led an end-to-end encrypted election system in which ballots are tallied entirely under encryption.
- Because every ballot is stored and tallied as **ciphertext**, attacks that compromise the server or database — SQL injection, data exfiltration, vote tampering — yield only encrypted data, neutralizing entire classes of attacks conventional voting systems are exposed to.

EXPERTISE

Engineering: C++20, C# / .NET 8, Python, TypeScript / React, SQL · Linux & Windows, DevExpress / WinForms · concurrency & lock-free systems, distributed & real-time architecture · FastAPI / HTMX, PostgreSQL / TimescaleDB · machine learning.

Languages: Korean (native), English (fluent — U.S. educated).