Jonathan Ly

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Education

University of Washington Seattle, WA

Bachelor of Science in Computer Science, Minor in Applied Mathematics *Sept. 2021 – June 2025*

Relevant Coursework: Discrete Math, Software Design & Implementation, System & Software Tools, Data Structures & Parallelism, Software Engineering, Introduction to Algorithms, Programming Languages, Computational Complexity, Database Management Systems, Systems Programming, Database System Internals, Cryptography

Experience

Business Analyst Intern July 2025 – August 2025

City of Seattle – Human Services Department *Seattle, WA*

- Conducted user testing and identified usability "pain points" in a contracts database, proposing design changes (e.g., surfacing hidden attributes) that improved searchability and data accessibility.
- Performed quality control on data dashboards and raw datasets, ensuring accuracy and consistency across reports.
- Participated in inter-team/inter-department meetings, contributing observations on data and systems integration.

Teaching Assistant Sept. 2024 – March 2025

University of Washington – Paul G. Allen School of Computer Science and Engineering *Seattle, WA*

- Teaching assistant for CSE 421: Introduction to Algorithms at the University of Washington.
- Held weekly office hours and quiz section to provide small-group support, addressing general and individual questions about homework and course materials.

Software Developer Intern June 2024 – August 2024

Seattle University – Department of Electrical and Computer Engineering *Seattle, WA*

- Built and evaluated vision robotics hardware and software, reproducing software for use as educational material in Seattle University's robotics courses.
- Implemented basic driver for Neopixel LEDs, used driver to design and implement a modular system enabling easy creation and modification of patterns on a light board.
- Implemented movement-based sensor software to smooth noisy inputs and reduce false activations by 90%.

Undergraduate Research Assistant Jan. 2024 – June 2024

University of Washington – High-Performance and Data-Intensive Computing Lab *Seattle, WA*

- Conducted in-depth literature review to investigate the theoretical foundations and practical applications of homomorphic encryption (HE) within database management systems (DBMS).
- Developed proficiency in HE libraries, such as Microsoft SEAL, through the implementation and optimization of various encryption schemes in practice.
- Evaluated the performance of HE schemes on CloudLab clusters to identify efficiency and scalability benchmarks.

Projects

Cached Homomorphic Encryption [CacheAL] | *C++, CMake, Microsoft SEAL* Jan. 2024 – June 2024

- Designed and implemented Zinc, a novel HE scheme over Microsoft SEAL, reducing encryption time by 50%.
- Formally proved the correctness and security of Zinc in an academic paper (https://arxiv.org/abs/2408.07304v1).
- Empirically verified significant efficiency gains using benchmarks run on CloudLab on real-world datasets.

Music Recommender [BeatBuddy] | *Node.js, TypeScript* March 2023 – June 2023

- Developed a music recommendation system ("BeatBuddy") using Node.js and TypeScript in a collaborative 10-week software engineering course.
- Leveraged the Spotify API to build a recommendation engine suggesting similar songs based on user input.
- Achieved over 90% test coverage for crucial modules, ensuring code quality and reliability.
- Facilitated efficient development workflow by creating comprehensive developer documentation.
- Implemented CI/CD pipeline to automate test execution on code updates, promoting continuous integration.

Technical Skills

Languages: Java, Python, C/C++, Go, OCaml, Rocq Proof Assistant, SQL, MATLAB
Developer Tools & Technologies: Git (& GitHub/GitLab), VS Code, IntelliJ IDEA, CMake, Node.js, Express.js, JUnit, Jest, SQLite, Azure SQL Server, Linux
Libraries: Microsoft SEAL, Google Test, NumPy, PyTest