Ryan Liu

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Skills Summary

- Collaborated on enterprise cloud computing research and performance optimization over 3 years using Java, Python, C++, and JavaScript, working with frameworks like OpenLiberty and Spring.
- Experience over 3 years in full-stack web application development with React, Node, and Django using HTML, CSS, TypeScript, and Python, following software engineering best practices and standards.
- Built internal development tools in C# over 1.5 years that streamlined workflows and development cycles.
- Designed SQL and NoSQL databases with a focus on scalability and robust analytical capabilities.
- Worked in fast-paced Agile environments using Git, delivering high quality software through cross functional teamwork across all stages of SDLC.
- Deployed and managed containerized applications on various cloud platforms (AWS, IBM Cloud, and GCP) using Docker, Helm, Kubernetes, Prometheus, and Sysdig.
- Hands-on experience with statistical analysis, AI algorithms, and machine learning techniques using numpy, pandas, TensorFlow, PyTorch, and scikit-learn to solve complex problems.
- Championed projects as a quick-learner with a result-oriented mindset by identifying bottlenecks, resolving challenges, and excellent communication with peers to drive team success.

Work Experience

Software Engineer **Sept. 2016 – Sept. 2019**

Stamplus Rewards *Richmond, BC*

- Led sprint planning, product documentation, database design, and API design of a mobile rewards platform for merchants in Metro Vancouver region.
- Utilized AWS cloud computing services to deploy and operate Python-based (Django) backend with RESTful API to facilitate CRUD operations in PostgreSQL DB.
- Slashed rewards collection time during checkout by **25%** by gathering stakeholder feedback and designing auto-expiring QR codes.
- Improved user engagement by **20%** by incorporating third-party features, including social media platform integration using Facebook and Google APIs and push notifications using Firebase.
- Worked on a responsive mobile frontend for reward collection and redemption using TypeScript, Ionic, and React, which enhanced user engagement and streamlined the overall experience.

Junior Software Developer **Jan. 2017 – Aug. 2018**

Archiact Interactive *Vancouver, BC*

- Collaborated cross-functionally with UI/UX designers to build custom, internal development tools using C# (Unity) for Marvel: Dimension of Heroes; improved UI/UX-related development speed by **50%**.
- Converted existing codebase of non-VR/non-AR games into VR/AR compatible versions published on various platforms, titles include Waddle Home and Darknet.

Projects and Publications

An Adaptive Heuristic-Based Framework to Enhance JITServer Technology

https://casweb.ef52d293.public.multi-containers.ibm.com/ibm/cas/canada/research/1166

- Spearheaded experiments to improve microservice application startup time by **10%** via reducing Java container image size (by up to **50%**) automatically using Python scripts.
- Analyzed benchmark applications (Spring and OpenLiberty) using Bash, C++, and Python to identify up to **18%** of JIT compilations can be further optimized to improve Java application performance in Eclipse OpenJ9 JVM.
- Led development of a visualization tool to aid understanding of Java compilation and optimization behaviour for developers; used JavaScript (vis.js), HTML, CSS (Bootstrap).
- Published international conference papers; received the **best paper award** at CASCON 2024 as main author.

AHA: Adaptive Hadoop in Ad-hoc Cloud Environments

https://ieeexplore.ieee.org/document/9659512

- Designed data-driven Resource-aware Task Scheduler (using Java) for running distributed computing within ad-hoc cloud environments; improved performance by up to **20.2%**.

Using POMDP-based Approach to Address Uncertainty-Aware Adaptation for SPS
https://arxiv.org/abs/2308.02134

- Modeled state uncertainty and model parameter uncertainty within a data-driven Moving Target Defense deployment process using Reinforcement Learning and Bayesian Machine Learning techniques.
- Implemented and analyzed the approach on simulated cryptojacking scenario on distributed systems using C++ and Python; reduced compromise frequency by up to **50%** while preserving **99%** availability of protected services.

FlaKat: A Machine Learning-Based Categorization Framework for Flaky Tests
https://arxiv.org/abs/2403.01003

- Developed AI-based pipelines for fast and accurate flaky testing categorization of Java unit tests using Python and scikit-learn, which can be integrated into CI/CD workflows.
- Achieved F_1 scores of up to **94%** for certain categories of flaky tests.

Education

PhD in Computer Engineering **Sept. 2020 – May 2025 (expected)**
University of Waterloo *Waterloo, ON*

- Postgraduate Scholarship - Doctoral Program, Natural Sciences and Engineering Research Council of Canada
- President's Graduate Scholarship, University of Waterloo

Master of Engineering in Computer Engineering **Dec. 2019**
University of Waterloo *Waterloo, ON*

Bachelor of Applied Science in Computer Engineering (with Distinction) **May 2015**
University of British Columbia *Vancouver, BC*