Simon Marcotte

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Education

University of Alberta **Class of 2026**
Bachelor of Science - Computer Engineering Co-op *4th Year*

Experience

Software Engineering Intern **January 2024 – August 2024**
General Fusion Inc. *Richmond, BC*

- Led the design of the core control system by developing an OOP-based Python async TCP server that simultaneously collects data from over 20 machine diagnostics 30 times daily, providing critical data for company decisions.
- Redesigned the data pipeline by building a Docker-deployed Flask service from scratch to serve raw data files, including error handling and Swagger documentation, speeding up raw data access by reducing API calls by 60%.
- Collaborated with Lisbon researchers to gather requirements, design, test, and deliver a custom driver in Python to interface with three diagnostics over SSH, leveraging Pydantic models for configuration type safety.
- Implemented a server system monitor by redirecting docker logs to Elasticsearch via Fluentd, visualised with Kibana.
- Refactored MATLAB signal analysis code into Python, replacing the Floyd-Warshall algorithm with a custom pathfinding algorithm using NumPy and SciPy, achieving an 87% runtime speedup.
- Introduced CI/CD pipelines using GitHub Actions and hooks to standardize company-wide Git submodules and configuration files, ensuring consistent server uptime through correct backend setup.
- Collaborated across cross-functional teams—including physicists, software, and electrical engineers—to gather requirements, manage projects, and deploy solutions aligned with company objectives.

Projects

Airflow Stock Data Pipeline | ***link*** | *Airflow, Python, BigQuery, Flask, Docker, GCP, Astro* **August 2024**

- Developed an ETL pipeline using Apache Airflow and Alpha Vantage API to extract, transform, and load 20 years of stock data into a data warehouse, calculating the previous daily top gainer's maximum growth.
- Deployed a Flask service using Cloud Build as a data interface, with serverless architecture for on-demand scalability.
- Enabled GCP integration with Airflow variables by mounting Docker volumes with service account IAM permissions.
- Achieved efficient data storage and querying by leveraging Google BigQuery as a scalable data warehouse solution.
- Developed Apache Airflow DAGs using Python and Pandas to analyze 2000+ entries of stock data per day.
- Containerized the Airflow environment using Docker and Astro CLI, ensuring cross-platform compatibility.

Bot2Engg Discord Bot | ***link*** | *Python, Terraform, GCP Compute Engine* **June 2024**

- Deployed a Discord bot on a Terraform-provisioned GCP e2-micro VM for optimal performance and cost efficiency.
- Designed and implemented a secure virtual private cloud (VPC) environment with custom subnets and firewall rules to safely host the application and manage traffic, enhancing overall security and isolation.
- Facilitated task automation, information delivery, and active engagement for 300+ members across 3 servers.

CUDA Mandelbrot Speedup | *C++, CUDA, Parallel GPU Programming* **April 2024**

- Leveraged CUDA GPU parallel programming to redesign a program which computes and renders the Mandelbrot set, achieving a 1280% speedup with CUDA C compared to its CPU C++ equivalent.
- Dynamically scaled threads with image dimension, capable of generating an 11kx11k resolution gray scale image in 5s.

Extra Curricular

Senior Executive - Co-VP Academic | *UofA Computer Engineering Club* **May 2024 – Present**

- Developing a cloud computing certification program for students, providing hands-on experience with cloud platforms like AWS and GCP, and fostering skills in Python, REST APIs, and cloud infrastructure and services.
- Managing a group of 3 Junior Executives, delegating tasks, providing support and ensuring timely project delivery.

ENGG 100 Teaching Assistant | *Faculty of Engineering - University of Alberta* **August 2024 – Present**

- Preparing class resources and facilitating communication with students to provide academic support and feedback.

Skills

Software: Python, GCP, AWS, Apache Airflow, Docker, Astro, VM, SQL, BigQuery, Terraform, C++, Flask, APIs
Developer Tools: Git, Linux, WSL, VS Code, Postman, MySQLWorkbench, MongoDB Compass