

# Omar Farag

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## Education

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### University of Toronto

Bachelor of Applied Science in Computer Engineering

Toronto, ON

September 2019 – June 2024

## Experience

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### Red Hat Inc.

May 2022 – August 2023

Software Engineering Intern

Toronto, ON

- Worked with the Advanced Cluster Management team in an agile environment using SCRUM methodologies on emerging middleware technology for hosting OpenShift control planes. Utilized **AWS**, **Kubernetes**, & **Golang**.
- Created controllers to speed up cluster re-import time by **30x** and to automatically import new clusters, by utilizing **Golang** & the **Kubernetes** controller pattern.
- Prototyped and implemented a method to load balance the placement of hosted clusters on hosting clusters.
- Used **Tekton CI/CD** and **Bash** to create an Openshift pipeline to run daily smoke tests on new Hypershift builds.
- Refactored the middleware operator data structures and control flow, reducing cache size and improving reliability.
- Fixed backend security issues, investigated customer support tickets, and improved GUI usability.

### Medical Computer Vision & Robotics - SickKids

July 2021 – November 2021

Research Assistant

Toronto, ON

- Developed a physics simulation using **C#** and **Unity** to help surgeons simulate the cutting of flesh during surgical operations.
- Researched methods to develop accurate simulations of lasers interacting with flesh, with a focus on simulation speed and collision accuracy.
- Used the Burst Compiler and Jobs System in Unity to improve frame rendering from **20 fps** to **300 fps**.

## Side Projects

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### AWS Hackathon, 3rd Place/24 Teams - Toronto AWS Office

March 2024

- Built a note taking app for students with disabilities, allowing the upload and subsequent compilation of audio/lecture recordings, slides and notes into a comprehensible markdown.
- Implemented a database with **S3**, transcription and compilation with **Bedrock**, triggers with **Lambda**, etc.
- Presented the project's technical architecture to a panel of judges and an audience at the AWS Toronto office.

### UofT Aerospace Team

June 2021 – November 2021

Software Developer & Researcher

Toronto, ON

- Researched and developed a novel compression method responsible for efficiently compressing and relaying the dense 3D satellite imagery of the HERON MK II.
- Designed a compression algorithm to predict image data based on previous data, effectively transforming a dense image into a lightweight and easily transferable neural network.

### 3D Software Renderer

- Used **C++** to build a software renderer entirely pipelined in the CPU that renders meshes to the Windows console. Built from scratch with no graphics APIs, just linear algebra.
- Used a variation of the *Painter's Algorithm* to render out of view triangles before closer objects.
- Used back face culling and clipping out of view triangles to speed up the renderer by **5x**.

### Mini C Compiler

- Implemented a compiler for a C language subset using LLVM.
- Built a lexical analyzer for syntax parsing using tokenizer concepts.
- Constructed an AST to represent program structure, allowing for efficient node visiting and manipulation.
- Applied the Visitor pattern to traverse and perform operations on the AST, facilitating code generation and optimization.

## Technical Skills

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**Languages:** C/C++, Golang, Python, Java, JavaScript/TypeScript, ARM Assembly, Verilog, HTML/CSS

**Developer Tools & Technologies:** LLVM, Kubernetes, Docker, AWS, Git, Jira, Tekton CI/CD, Google Cloud Platform, Blender 3D, Unity