Extending ElmJr with Metal

Project Proposal - Capstone 2020

Introduction

ElmJr (Zhang et al. 2018) is a graphics creation application, used by the McMaster Outreach program as part of a variety of tools used to teach grade school students computer science. The application is a projectional edtior for the Elm language, which allows users to create basic shapes and geometry in 2D without running into syntax and type errors. The main goal of this project is to re-implement the back-end of the application, which currently uses UIKit to render graphics, to use Metal (Inc., n.d.), an Apple framework that provides access to Apple GPUs.

Team

The team members will consist of the following:

- Lucas Matthew Dutton - 4th year Software Engineer
- Michael Le - 4th year Software Engineer
- Saad Khan - 4th year Software Engineer and Embedded Systems
- Thomas Bernard Armena - 4th year Software Engineer
- Wyatt Wismer - 4th year Software Engineer

Hard Goals

A list of hard goals that this project will aim to complete are:

- Understand all technologies involved in the project, including the Elm and Swift languages, and the Metal GPU language.
- Reimplement the rendering backend to use Metal.
- Add support for the interpreter front-end to support recursion in functions.

Stretch Goals

A list of stretch goals that this project may complete are:

- Add support for 3D graphics, using Elm 3D as the front-end language. This goal is dependent on an external team working on the completion of Elm 3D.
- Supporting user interaction with the generated graphics.
- Benchmarking and optimizing the process of rendering graphics.

References

Inc., Apple. n.d. "Metal." *Apple Developer*. https://developer.apple.com/metal/.

Zhang, John, Anirudh Verma, Chinmay Sheth, Christopher W Schankula, Stephanie Koehl, Andrew Kelly, Yumna Irfan, and Christopher Kumar Anand. 2018. "Graphics Programming in Elm Develops Math Knowledge & Social Cohesion." In *CASCON*, 157–67.