ECE 555 Group Presentation

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Why not Just Use C?

It should not be used for production.
See `https://veresov.pro/cmustdie/`

insert real/fake cat example from
`https://www.youtube.com/watch?v=z-0-bbc80JM&t=514s`

Insert image of my IDE showing an error such as attempting to use a value after it is moved out of scope.

Why Rust?
Ergonomics while remaining fast

Here I may include my rust implementation of project 1 and compare it to my C version in both ergonomics, safety, and speed.

Why Rust?
Compiler has Super Powers

Since the type system has information about our data, both ownership and lifetime, safe parallel processing is much easier. Chunks are a perfect example of this. The typesystem ensures that each chunk references a seperate portion of memory. This is why paraellizing an iterator over a chunks or chunks_mut object is trivial.

Rust and CUDA
Current options

- Rust GPU
- Rust CUDA

Maybe mention other options for GPU programming in rust, like any rust support for ROCm, HIP, intel gaudi, or other.

Rust and CUDA
Description of how the Rust-CUDA crate works

Rust and CUDA
Problems with shared memory access in rust, therefore we need to use unsafe

Rust and CUDA
Focusing on Rust CUDA

Currently being rebooted and is in active development.
Uses nvidia's nvvm tool which is built on LLVM 7.

What is a compiler?

Description of problems when going straing from source code to machine code.

The problem LLVM solves

Description of LLVM and it's intermediate representation and how this has enabled much easier language development.

NVVM

How NVVM works

Rust CUDA and NVVM

How NVVM is used in Rust CUDA

Fractals
Mandelbrot and Burning Ship

$c \in \mathbb{C}$ is in the mandelbrot set if the sequence $\{z_n\}$ converges.

$$z_{n+1} := z_n^2 + c \qquad z_0 = 0$$

The Burning Ship fractal is defined similarly but the sequence is

$$z_{n+1} := (|\text{Re}(z_n)| + |\text{Im}(z_n)|i)^2 + c \qquad z_0 = 0$$

I will add the single, frame timing results here

I plan to be sharing my screen for the presentation and will switch to a live demo here.

This is a slide
With a subtitle

This is some text in a column. Could be a figure instead.

- This is a list
- It is an itemized one
- Hence the bullets