Julia for HPC

Julia BoF, 11/20/2025

Roman Lee

About me

PhD in computational plasma physics at UCLA

Postdoc at NERSC, Lawrence Berkeley National Lab since April 2025

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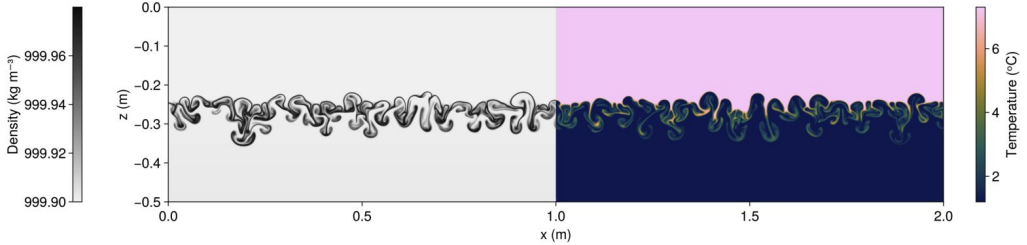
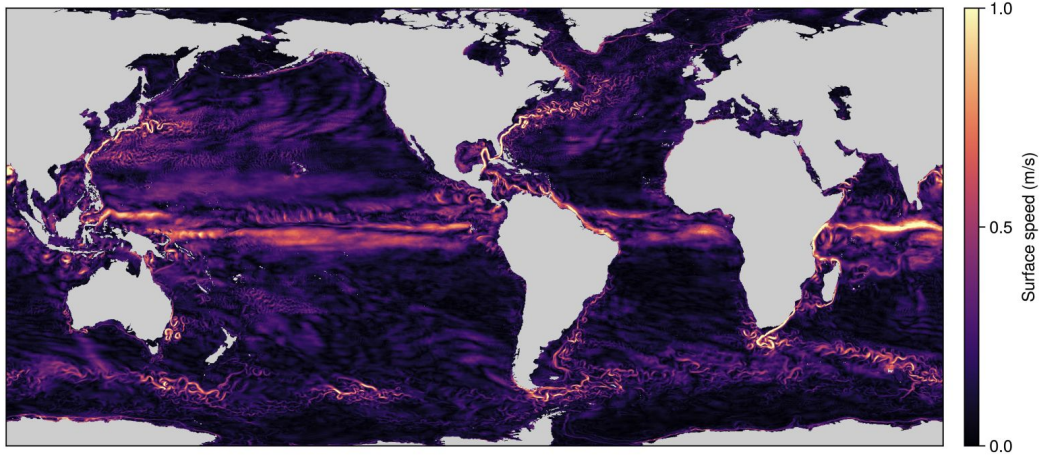
- NERSC Science Acceleration Program (NESAP) — NERSC/science teams/vendor partnership to prepare for the new system

Oceananigans.jl

Software tool for simulating ocean currents and fluid motion at all scales





github.com/CliMA/Oceananigans.jl

Oceananigans.jl

Vision: to balance the need for performance and productivity

Ongoing work in Oceananigans.jl: Leveraging Reactant.jl

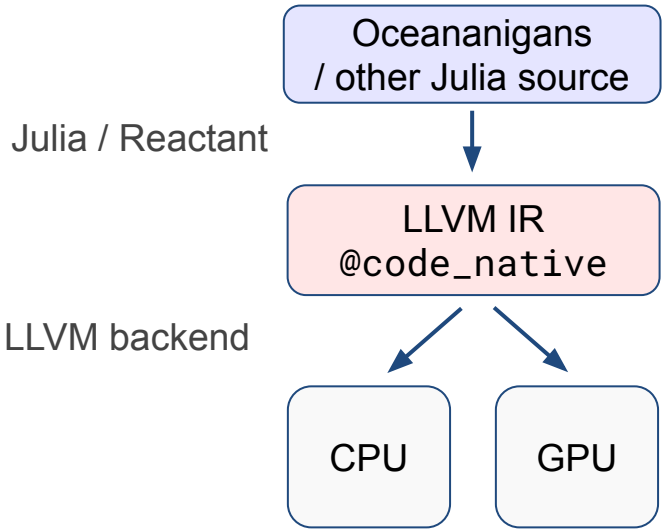
Reactant is an optimizing compiler framework for Julia built on MLIR

Provides two main capabilities:

- Performance portability via XLA — efficiently run general purpose Julia code on CPUs, GPUs, xPUs!
- Automatic differentiation via Enzyme

github.com/EnzymeAD/Reactant.jl

Julia compile pipeline



Reactant compile pipeline