Introduction to Julia for High-Performance Computing

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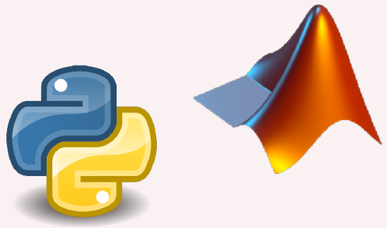
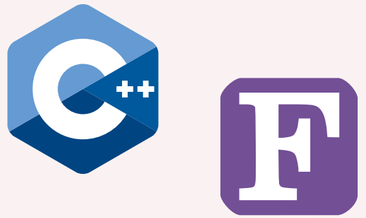
Convenience

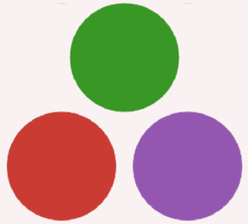


Performance

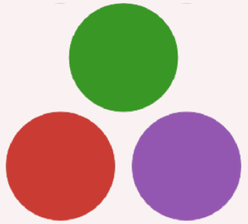


Language Barrier

Convenience



Performance



Gradual transition

	Tuesday	Wednesday	Thursday	Friday
	Foundations	**Core**	**Node**	**Cluster**
09:00 - 10:45	Intro Onboarding	Type & Memory Optimizations	Multithreading	Distributed Computing
10:45 - 11:00	Break	Break	Break	Break
11:00 - 12:30	Fundamentals	Exercises	Exercises	Exercises
12:30 - 14:00	Lunch	Lunch	Lunch	Lunch
14:00 - 15:30	Specialisation & Abstraction	SIMD & Profiling	GPU Computing	Exercises
15:30 - 15:45	Break	Break	Break	Outro
15:45 - 17:00	Exercises	Exercises	Exercises	

Quick Live Survey

Julia’s Weaknesses

HPC with Julia is currently a niche.

Limited support by vendors and HPC centers

Opportunity to network, contribute and grow

Join us at conferences ...

... or in our monthly Zoom call

(open to everyone!)

Achieving
high performance
can be tricky.

Garbage collection

Type instabilities

No great way to produce (small) binaries.

Can impact workflow on clusters

Hampers integration into existing code bases

Julia's Strengths

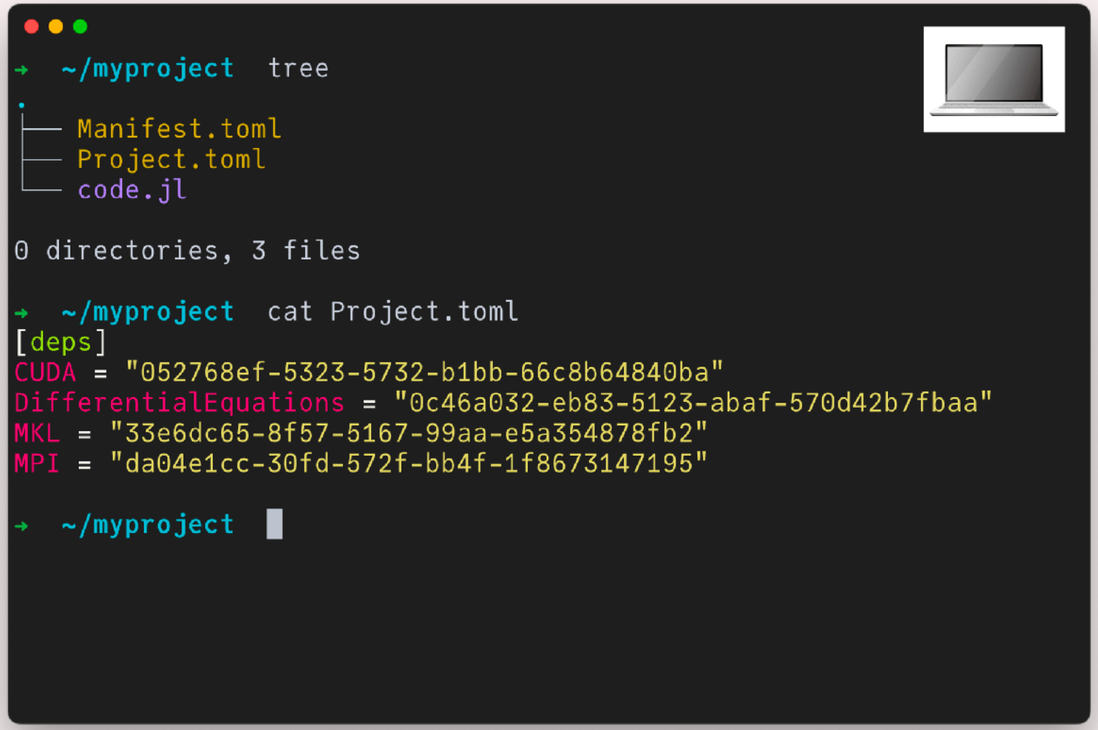
Julia is interactive and convenient.

Powerful REPL, Jupyter, ...

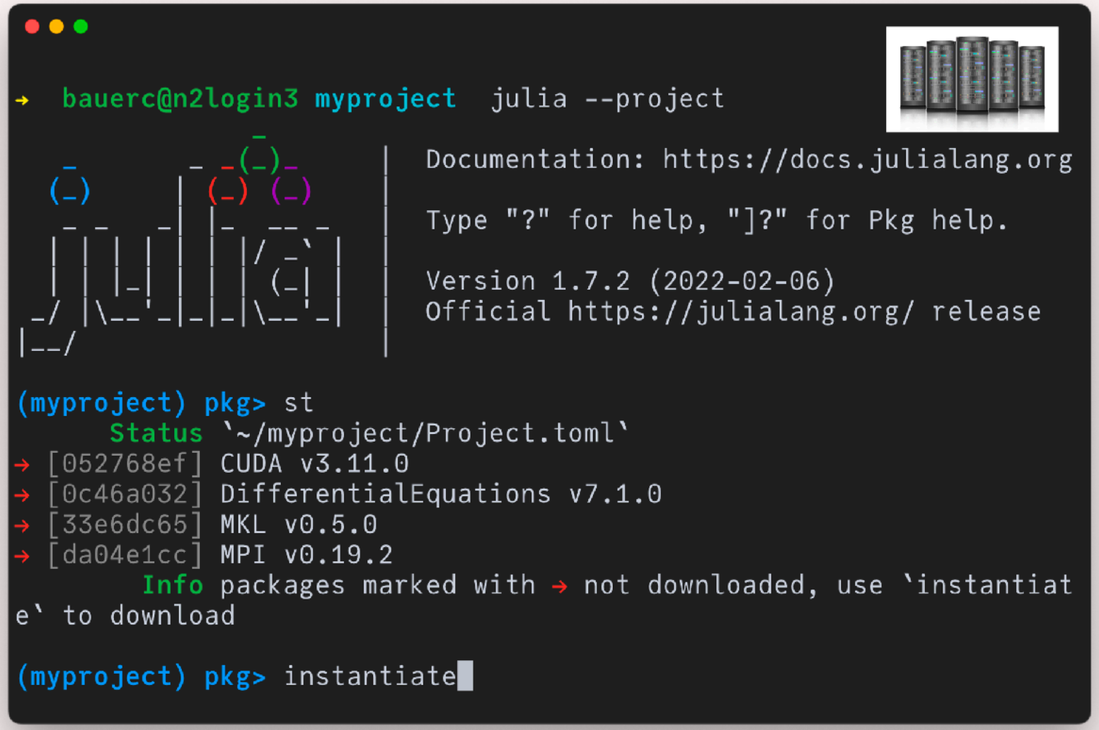
Great math support

Julia has a great package manager

Laptop



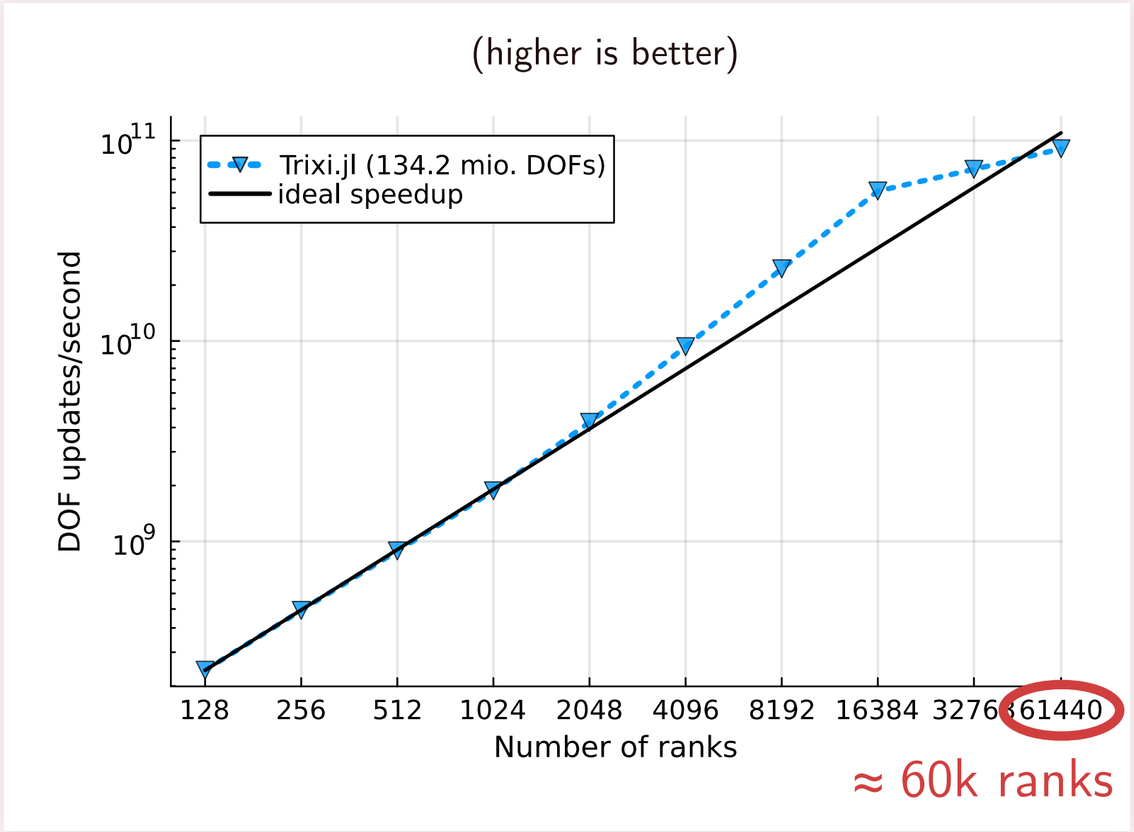
HPC Cluster



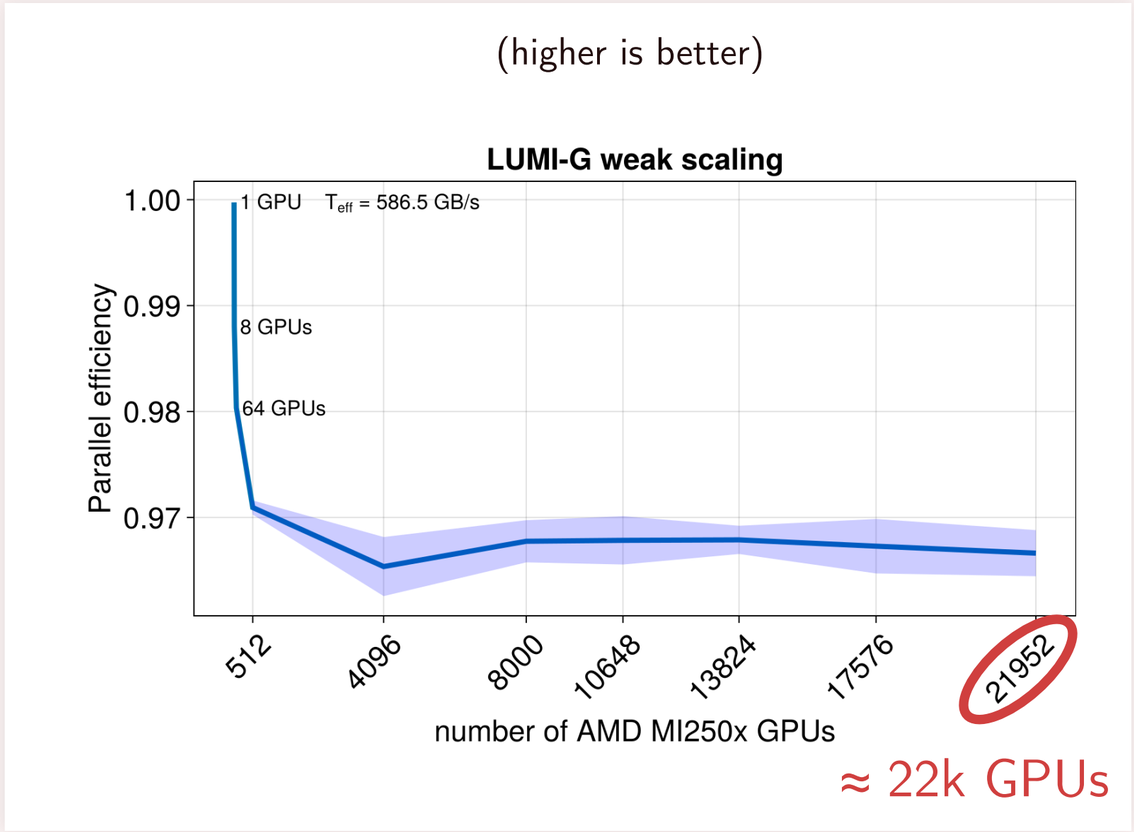
Julia code can be fast and scalable.

- Compilation via LLVM
- Great MPI support

Example: Good scaling of PDE codes



Trixi.jl (Multi-CPU)



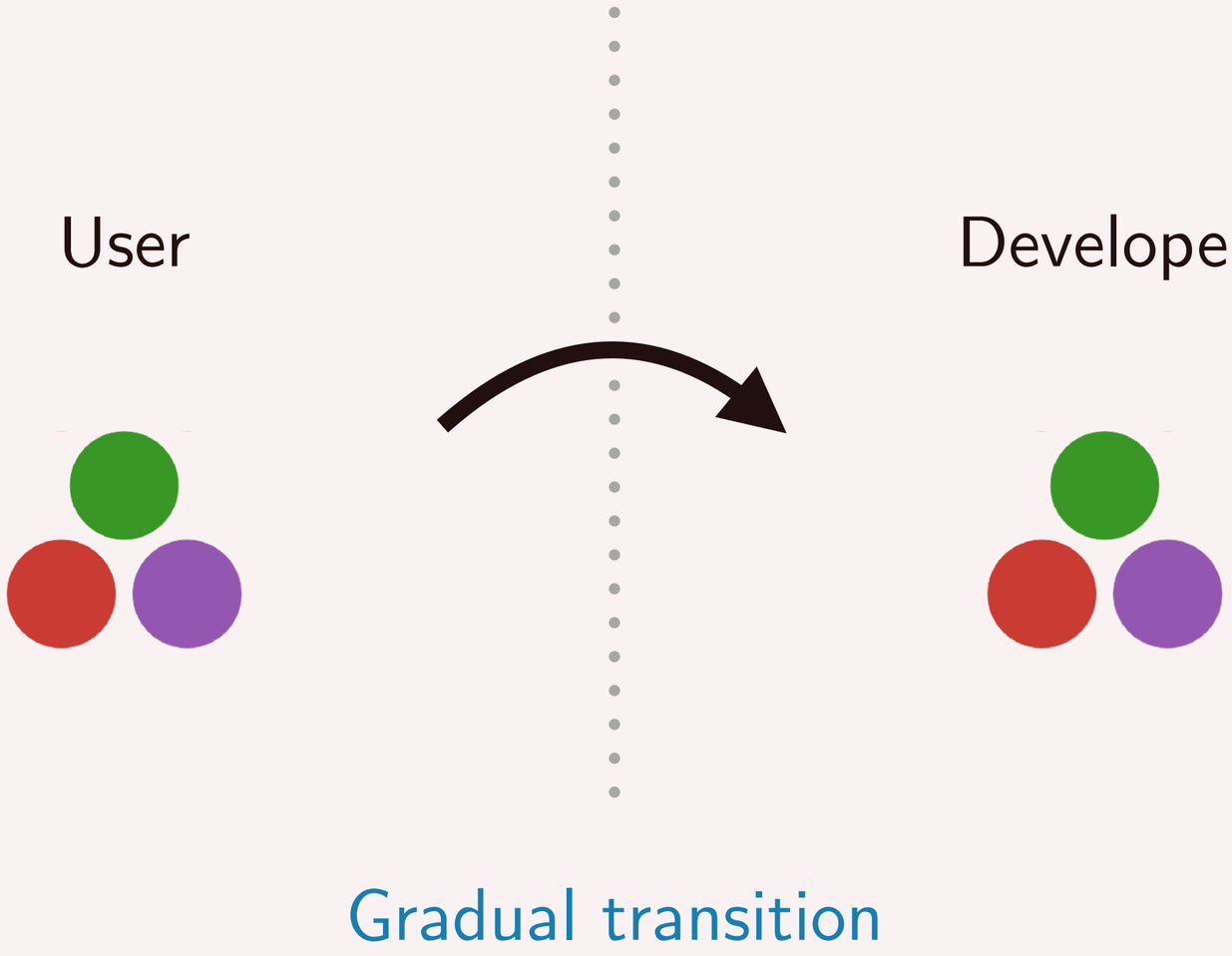
ParallelStencil.jl (Multi-GPU)

Julia invites you to gradually delve deeper.

Transparent and open source

Julia is (mostly) written in Julia

Julia makes it easier to become a developer.



Let us delve deeper!