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pyHPC 4500U Ryzen

AMD Ryzen 5 4500U testing with a LENOVO LNVNB161216 (EECN20WW BIOS) and AMD Renoir on Ubuntu 21.10 via the Phoronix Test Suite.

Automated Executive Summary

1 had the most wins, coming in first place for 77% of the tests.

Based on the geometric mean of all complete results, the fastest (3) was 1.008x the speed of the slowest (1). 2 was 0.994x the speed of 3 and 1 was 0.998x the speed of 2.

The results with the greatest spread from best to worst included:

PyHPC Benchmarks (Device: CPU - Backend: Numba - Project Size: 65536 - Benchmark: Equation of State) at 1.25x
PyHPC Benchmarks (Device: CPU - Backend: PyTorch - Project Size: 262144 - Benchmark: Equation of State) at 1.2x
PyHPC Benchmarks (Device: CPU - Backend: PyTorch - Project Size: 1048576 - Benchmark: Equation of State) at 1.13x
PyHPC Benchmarks (Device: CPU - Backend: JAX - Project Size: 4194304 - Benchmark: Isoneutral Mixing) at 1.091x
PyHPC Benchmarks (Device: CPU - Backend: JAX - Project Size: 262144 - Benchmark: Isoneutral Mixing) at 1.058x
PyHPC Benchmarks (Device: CPU - Backend: TensorFlow - Project Size: 262144 - Benchmark: Equation of State) at 1.056x
PyHPC Benchmarks (Device: CPU - Backend: Numpy - Project Size: 65536 - Benchmark: Equation of State) at 1.048x

PyHPC Benchmarks (Device: CPU - Backend: JAX - Project Size: 65536 - Benchmark: Isoneutral Mixing) at 1.038x
PyHPC Benchmarks (Device: CPU - Backend: TensorFlow - Project Size: 4194304 - Benchmark: Equation of State) at 1.034x
PyHPC Benchmarks (Device: CPU - Backend: TensorFlow - Project Size: 1048576 - Benchmark: Equation of State) at 1.028x.

Test Systems:

1

Processor: AMD Ryzen 5 4500U @ 2.38GHz (6 Cores), Motherboard: LENOVO LNVNB161216 (EECN20WW BIOS), Chipset: AMD Renoir/Cezanne, Memory: 16GB, Disk: 256GB SK hynix HFM256GDHTNI-87A0B, Graphics: AMD Renoir (1500/400MHz), Audio: AMD Renoir Radeon HD Audio, Network: Realtek RTL8822CE 802.11ac PCIe

OS: Ubuntu 21.10, Kernel: 5.13.0-20-generic (x86_64), Desktop: GNOME Shell 40.5, Display Server: X Server + Wayland, Vulkan: 1.2.182, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
Processor Notes: Scaling Governor: acpi-cpufreq schedutil (Boost: Enabled) - Platform Profile: balanced - CPU Microcode: 0x8600102 - ACPI Profile: balanced
Python Notes: Python 3.9.7
Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre_v1: Mitigation of usercopy/swaps barriers and __user pointer sanitization + spectre_v2: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: disabled RSB filling + srbs: Not affected + tsx_async_abort: Not affected

2

3

Processor: AMD Ryzen 5 4500U @ 2.38GHz (6 Cores), Motherboard: LENOVO LNVNB161216 (EECN20WW BIOS), Chipset: AMD Renoir/Cezanne, Memory: 16GB, Disk: 256GB SK hynix HFM256GDHTNI-87A0B, Graphics: AMD Renoir (1500/400MHz), Audio: AMD Renoir Radeon HD Audio, Network: Realtek RTL8822CE 802.11ac PCIe

OS: Ubuntu 21.10, Kernel: 5.13.0-20-generic (x86_64), Desktop: GNOME Shell 40.5, Display Server: X Server + Wayland, OpenGL: 4.6 Mesa 21.2.2 (LLVM 12.0.1), Vulkan: 1.2.182, Compiler: GCC 11.2.0, File-System: ext4, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise
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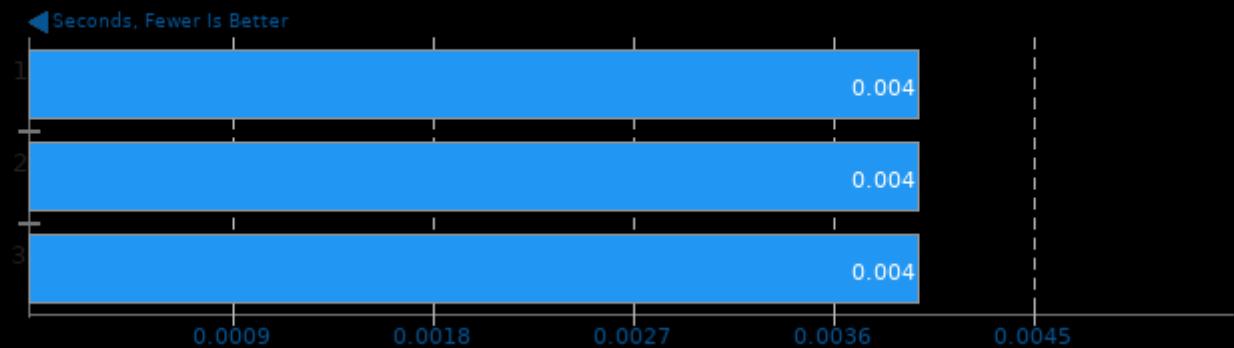
PyHPC Benchmarks - CPU - JAX - 16384 -	0.004	0.004	0.004
Isonewton Mixing (sec)			
PyHPC Benchmarks - CPU - JAX - 65536 -	0.002	0.002	0.002
Equation of State (sec)			
PyHPC Benchmarks - CPU - JAX - 65536 -	0.026	0.026	0.027
Isonewton Mixing (sec)			
Normalized	100%	100%	96.3%
PyHPC Benchmarks - CPU - JAX - 262144 -	0.005	0.005	0.005
Equation of State (sec)			
PyHPC Benchmarks - CPU - JAX - 262144 -	0.138	0.146	0.143
Isonewton Mixing (sec)			
Normalized	100%	94.52%	96.5%
PyHPC Benchmarks - CPU - JAX - 1048576 -	0.025	0.025	0.025
Equation of State (sec)			
PyHPC Benchmarks - CPU - JAX - 1048576 -	0.375	0.375	0.376
Isonewton Mixing (sec)			
Normalized	100%	100%	99.73%
PyHPC Benchmarks - CPU - JAX - 4194304 -	0.09	0.092	0.091
Equation of State (sec)			
PyHPC Benchmarks - CPU - JAX - 4194304 -	1.286	1.203	1.312
Isonewton Mixing (sec)			
Normalized	93.55%	100%	91.69%
PyHPC Benchmarks - CPU - Numba - 16384 -	0.001	0.001	0.001
Equation of State (sec)			
PyHPC Benchmarks - CPU - Numba - 16384 -	0.004	0.004	0.004
Isonewton Mixing (sec)			
PyHPC Benchmarks - CPU - Numba - 65536 -	0.005	0.004	0.004
Equation of State (sec)			
Normalized	80%	100%	100%
PyHPC Benchmarks - CPU - Numba - 65536 -	0.018	0.018	0.018
Isonewton Mixing (sec)			
PyHPC Benchmarks - CPU - Numpy - 16384 -	0.004	0.004	0.004
Equation of State (sec)			
PyHPC Benchmarks - CPU - Numpy - 16384 -	0.009	0.009	0.009
Isonewton Mixing (sec)			
PyHPC Benchmarks - CPU - Numpy - 65536 -	0.022	0.021	0.021
Equation of State (sec)			
Normalized	95.45%	100%	100%
PyHPC Benchmarks - CPU - Numpy - 65536 -	0.045	0.045	0.045
Isonewton Mixing (sec)			
PyHPC Benchmarks - CPU - Numba - 262144 -	0.016	0.016	0.016
- Equation of State (sec)			
PyHPC Benchmarks - CPU - Numba - 262144 -	0.067	0.067	0.067
- Isonewton Mixing (sec)			
PyHPC Benchmarks - CPU - Numpy - 262144 -	0.108	0.108	0.108
- Equation of State (sec)			

PyHPC Benchmarks - CPU - Numpy - 262144	0.194	0.194	0.193
- Isoneutral Mixing (sec)			
Normalized	99.48%	99.48%	100%
PyHPC Benchmarks - CPU - Theano - 16384	0.001	0.001	0.001
- Equation of State (sec)			
PyHPC Benchmarks - CPU - Theano - 16384	0.006	0.006	0.006
- Isoneutral Mixing (sec)			
PyHPC Benchmarks - CPU - Theano - 65536	0.006	0.006	0.006
- Equation of State (sec)			
PyHPC Benchmarks - CPU - Theano - 65536	0.026	0.026	0.026
- Isoneutral Mixing (sec)			
PyHPC Benchmarks - CPU - Numba - 1048576	0.067	0.067	0.067
- Equation of State (sec)			
PyHPC Benchmarks - CPU - Numba - 1048576	0.308	0.308	0.307
- Isoneutral Mixing (sec)			
Normalized	99.68%	99.68%	100%
PyHPC Benchmarks - CPU - Numba - 4194304	0.268	0.268	0.268
- Equation of State (sec)			
PyHPC Benchmarks - CPU - Numba - 4194304	1.287	1.287	1.288
- Isoneutral Mixing (sec)			
Normalized	100%	100%	99.92%
PyHPC Benchmarks - CPU - Numpy - 1048576	0.471	0.471	0.47
- Equation of State (sec)			
PyHPC Benchmarks - CPU - Numpy - 1048576	0.859	0.86	0.866
- Isoneutral Mixing (sec)			
Normalized	99.79%	99.79%	100%
PyHPC Benchmarks - CPU - Numpy - 4194304	2.116	2.118	2.118
- Equation of State (sec)			
PyHPC Benchmarks - CPU - Numpy - 4194304	3.402	3.402	3.41
- Isoneutral Mixing (sec)			
Normalized	100%	99.91%	99.91%
PyHPC Benchmarks - CPU - PyTorch - 16384	0.006	0.006	0.006
- Isoneutral Mixing (sec)			
PyHPC Benchmarks - CPU - PyTorch - 65536	0.002	0.002	0.002
- Equation of State (sec)			
PyHPC Benchmarks - CPU - PyTorch - 65536	0.026	0.026	0.026
- Isoneutral Mixing (sec)			
PyHPC Benchmarks - CPU - Theano - 262144	0.021	0.021	0.021
- Equation of State (sec)			
PyHPC Benchmarks - CPU - Theano - 262144	0.111	0.111	0.111
- Isoneutral Mixing (sec)			
PyHPC Benchmarks - CPU - PyTorch - 262144	0.006	0.006	0.005
- Equation of State (sec)			
PyHPC Benchmarks - CPU - PyTorch - 262144	0.118	0.119	0.118
- Isoneutral Mixing (sec)			
Normalized	100%	99.16%	100%

PyHPC Benchmarks - CPU - Theano -	0.085	0.085	0.085
1048576 - Equation of State (sec)			
PyHPC Benchmarks - CPU - Theano -	0.466	0.47	0.467
1048576 - Isoneutral Mixing (sec)			
Normalized	100%	99.15%	99.79%
PyHPC Benchmarks - CPU - Theano -	0.336	0.337	0.336
4194304 - Equation of State (sec)			
Normalized	100%	99.7%	100%
PyHPC Benchmarks - CPU - Theano -	1.927	1.936	1.927
4194304 - Isoneutral Mixing (sec)			
Normalized	100%	99.54%	100%
PyHPC Benchmarks - CPU - PyTorch -	0.023	0.026	0.024
1048576 - Equation of State (sec)			
Normalized	100%	88.46%	95.83%
PyHPC Benchmarks - CPU - PyTorch -	0.542	0.543	0.539
1048576 - Isoneutral Mixing (sec)			
Normalized	99.45%	99.26%	100%
PyHPC Benchmarks - CPU - PyTorch -	0.095	0.095	0.095
4194304 - Equation of State (sec)			
PyHPC Benchmarks - CPU - PyTorch -	2.208	2.238	2.19
4194304 - Isoneutral Mixing (sec)			
Normalized	99.18%	97.86%	100%
PyHPC Benchmarks - CPU - TensorFlow -	0.002	0.002	0.002
16384 - Equation of State (sec)			
PyHPC Benchmarks - CPU - TensorFlow -	0.006	0.006	0.006
65536 - Equation of State (sec)			
PyHPC Benchmarks - CPU - TensorFlow -	0.019	0.019	0.018
262144 - Equation of State (sec)			
Normalized	94.74%	94.74%	100%
PyHPC Benchmarks - CPU - TensorFlow -	0.037	0.036	0.036
1048576 - Equation of State (sec)			
Normalized	97.3%	100%	100%
PyHPC Benchmarks - CPU - TensorFlow -	0.15	0.149	0.145
4194304 - Equation of State (sec)			
Normalized	96.67%	97.32%	100%

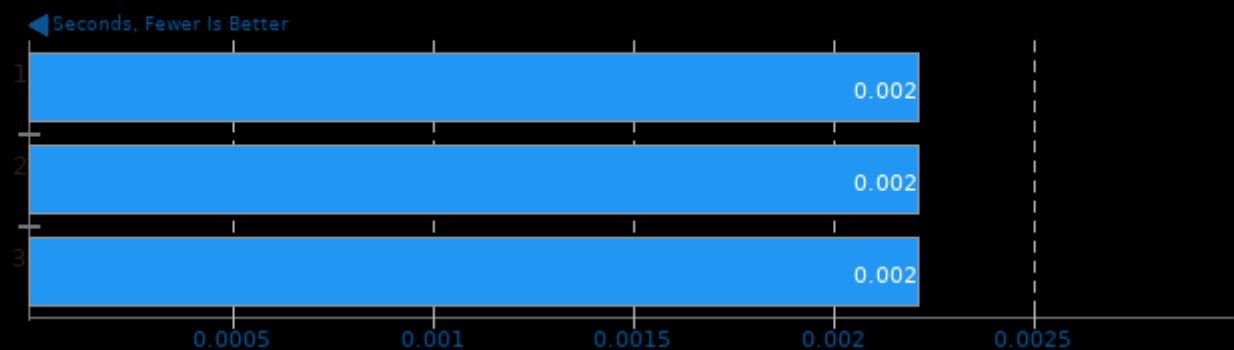
PyHPC Benchmarks 2.1

Device: CPU - Backend: JAX - Project Size: 16384 - Benchmark: Isoneutral Mixing



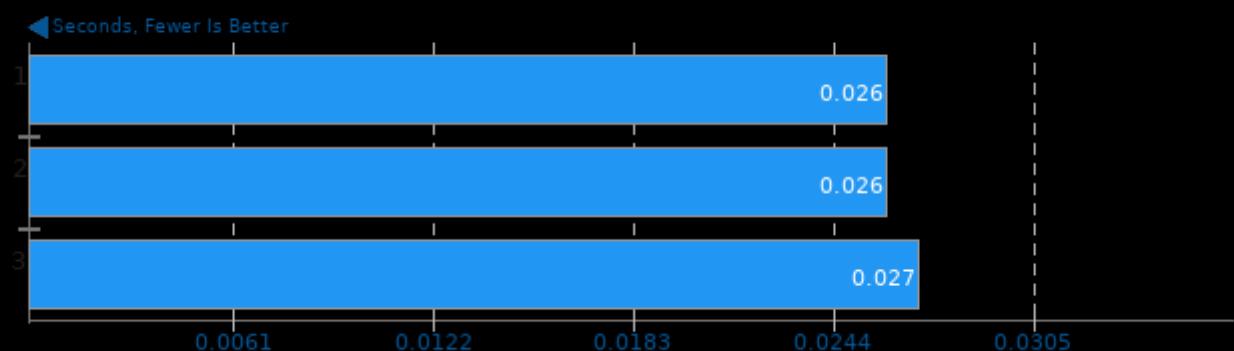
PyHPC Benchmarks 2.1

Device: CPU - Backend: JAX - Project Size: 65536 - Benchmark: Equation of State



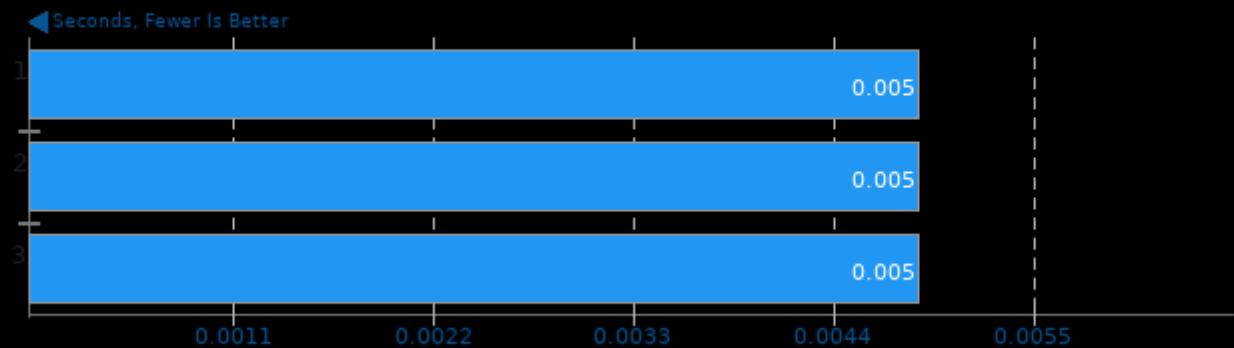
PyHPC Benchmarks 2.1

Device: CPU - Backend: JAX - Project Size: 65536 - Benchmark: Isoneutral Mixing



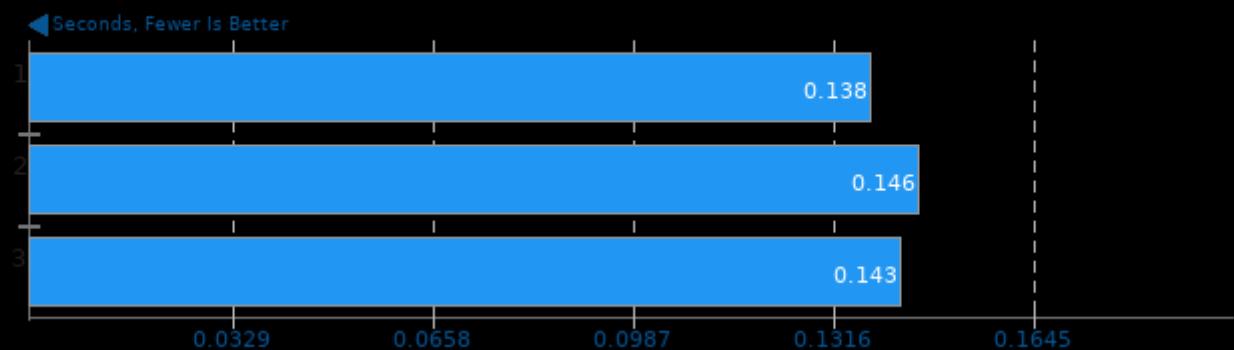
PyHPC Benchmarks 2.1

Device: CPU - Backend: JAX - Project Size: 262144 - Benchmark: Equation of State



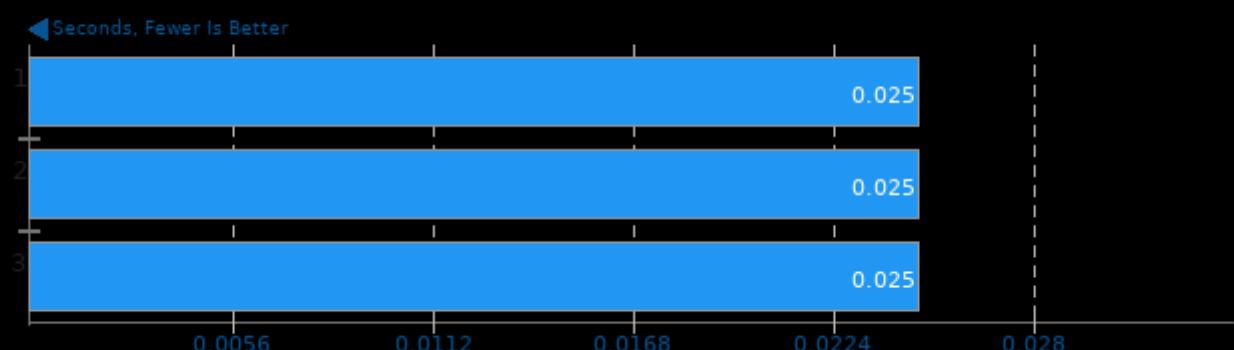
PyHPC Benchmarks 2.1

Device: CPU - Backend: JAX - Project Size: 262144 - Benchmark: Isoneutral Mixing



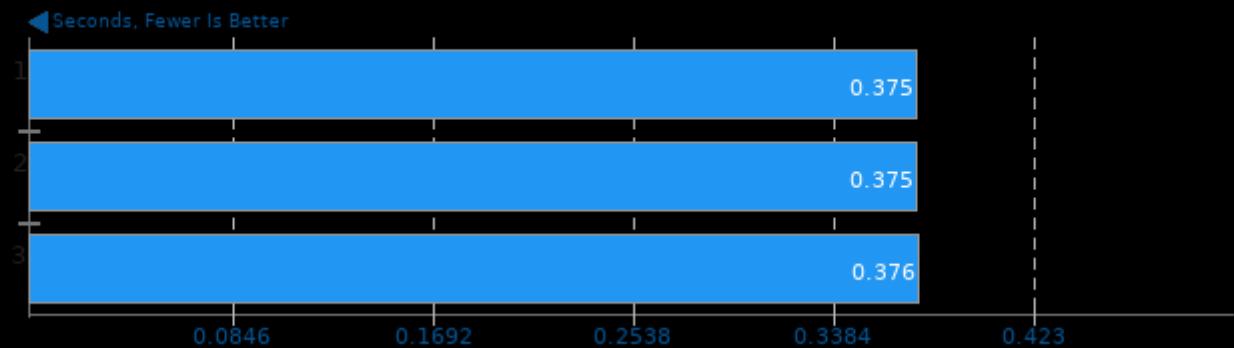
PyHPC Benchmarks 2.1

Device: CPU - Backend: JAX - Project Size: 1048576 - Benchmark: Equation of State



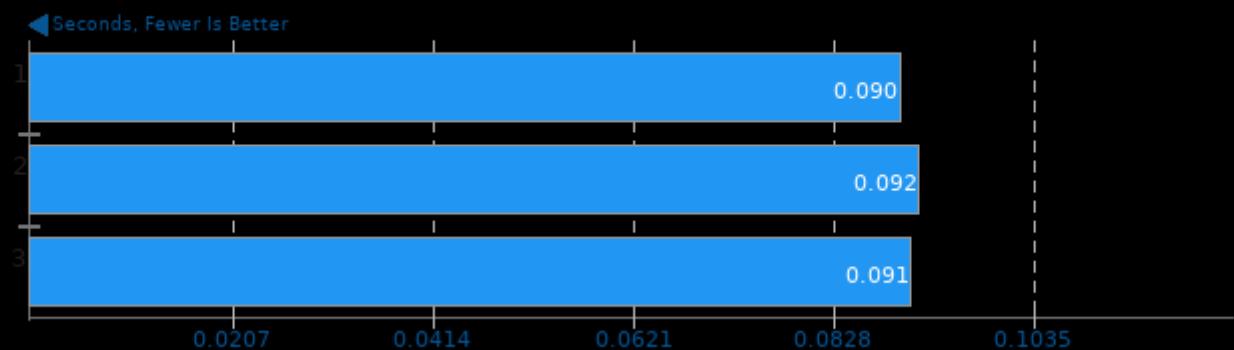
PyHPC Benchmarks 2.1

Device: CPU - Backend: JAX - Project Size: 1048576 - Benchmark: Isoneutral Mixing



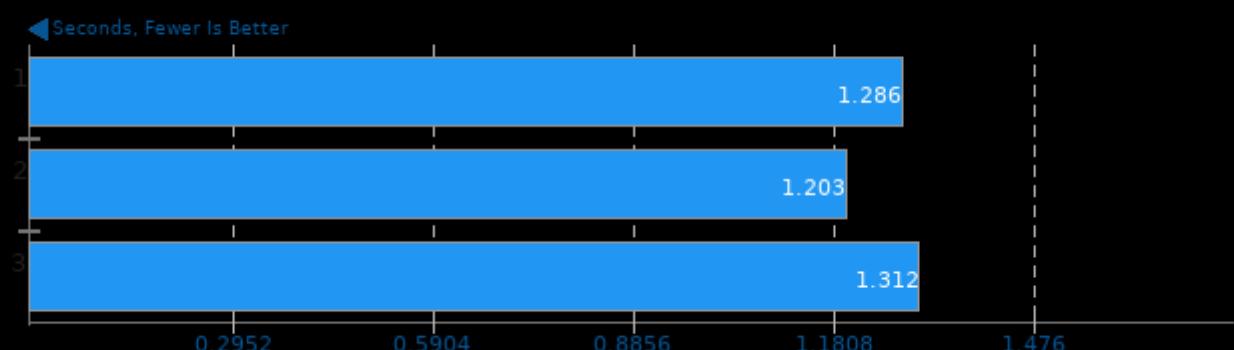
PyHPC Benchmarks 2.1

Device: CPU - Backend: JAX - Project Size: 4194304 - Benchmark: Equation of State



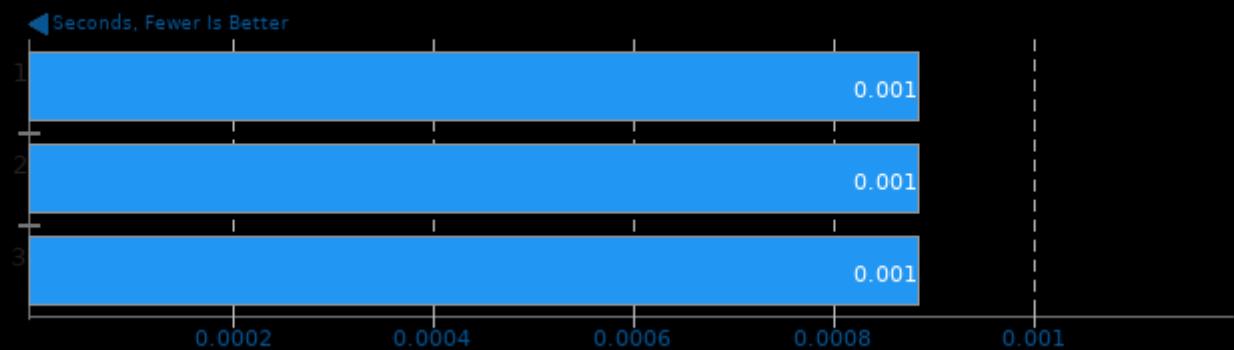
PyHPC Benchmarks 2.1

Device: CPU - Backend: JAX - Project Size: 4194304 - Benchmark: Isoneutral Mixing



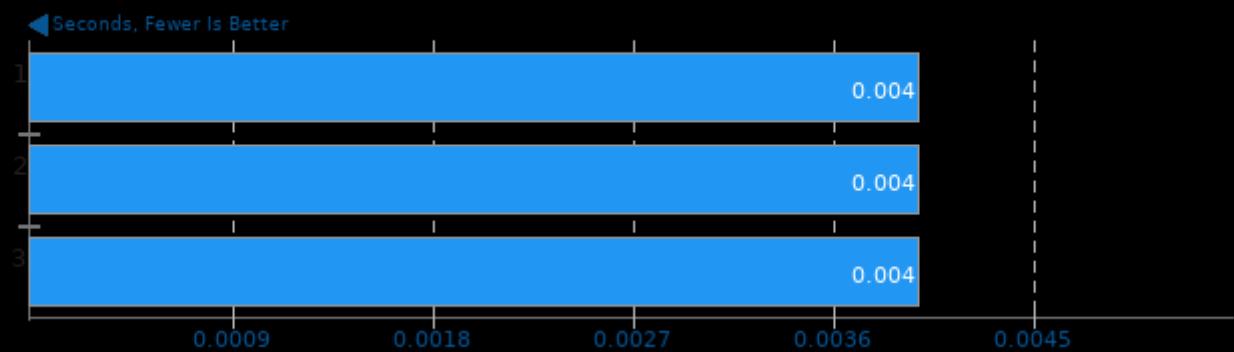
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numba - Project Size: 16384 - Benchmark: Equation of State



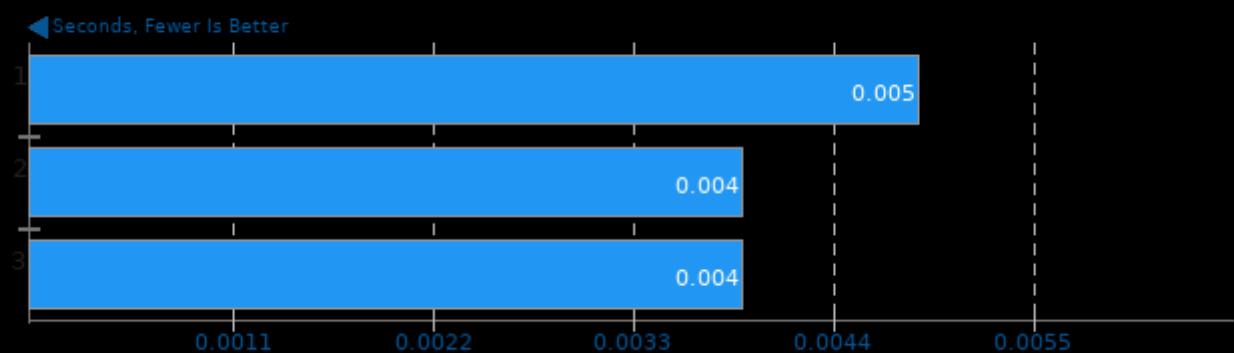
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numba - Project Size: 16384 - Benchmark: Isonutral Mixing



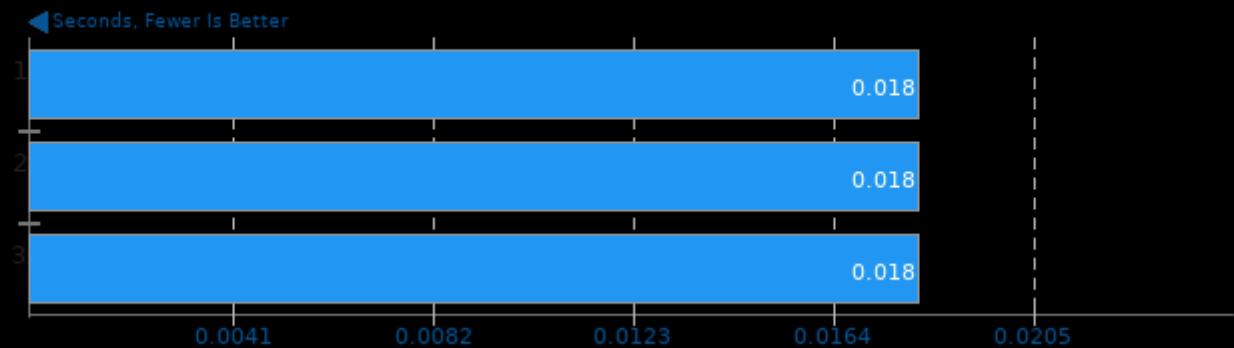
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numba - Project Size: 65536 - Benchmark: Equation of State



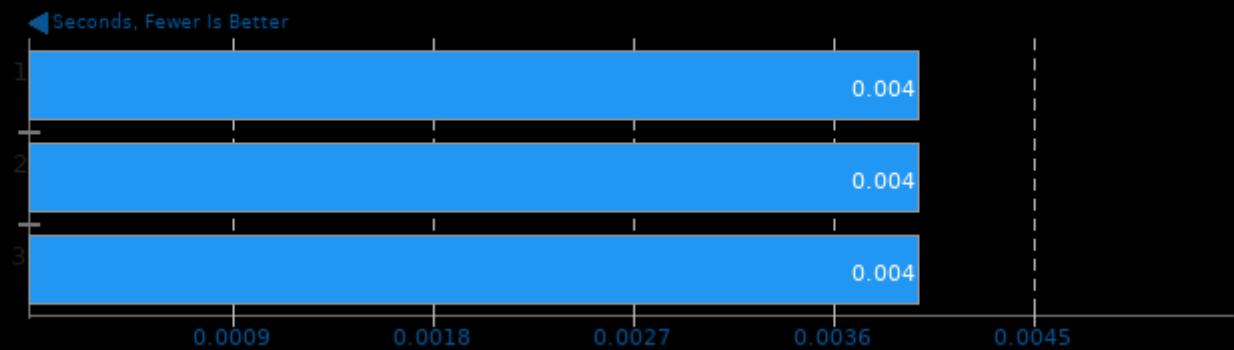
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numba - Project Size: 65536 - Benchmark: Isoneutral Mixing



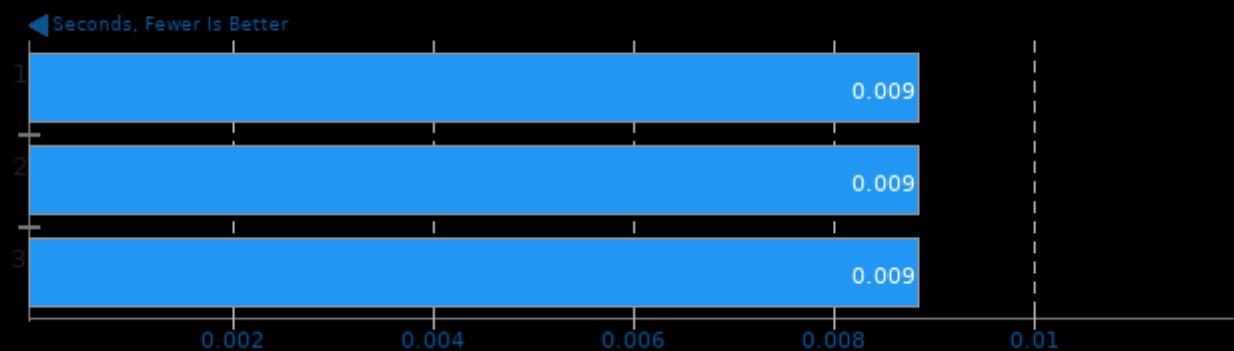
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numpy - Project Size: 16384 - Benchmark: Equation of State



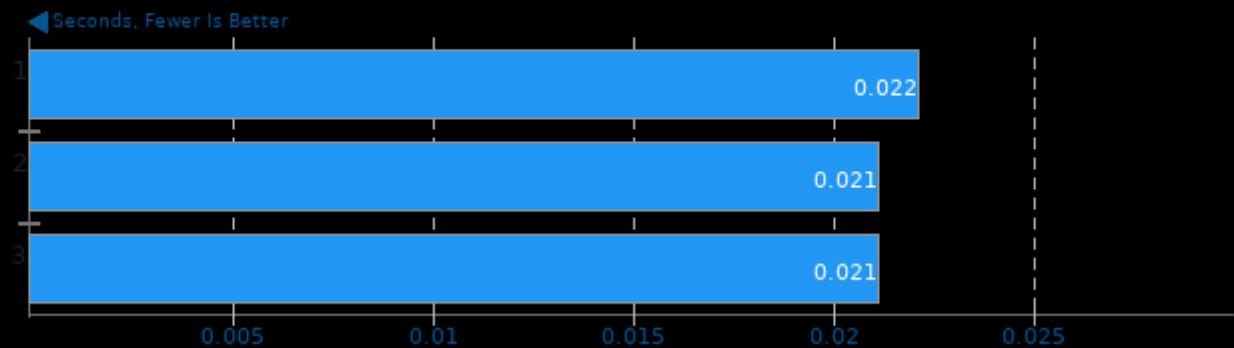
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Device: CPU - Backend: Numpy - Project Size: 16384 - Benchmark: Isoneutral Mixing



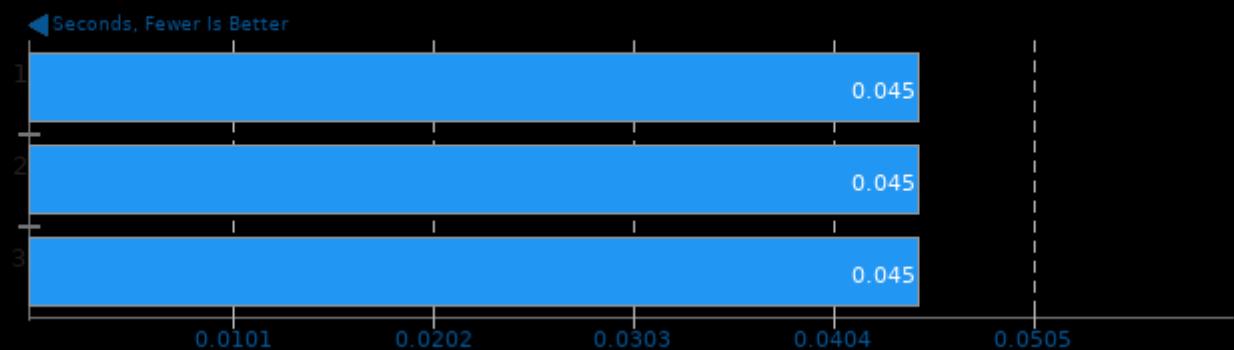
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numpy - Project Size: 65536 - Benchmark: Equation of State



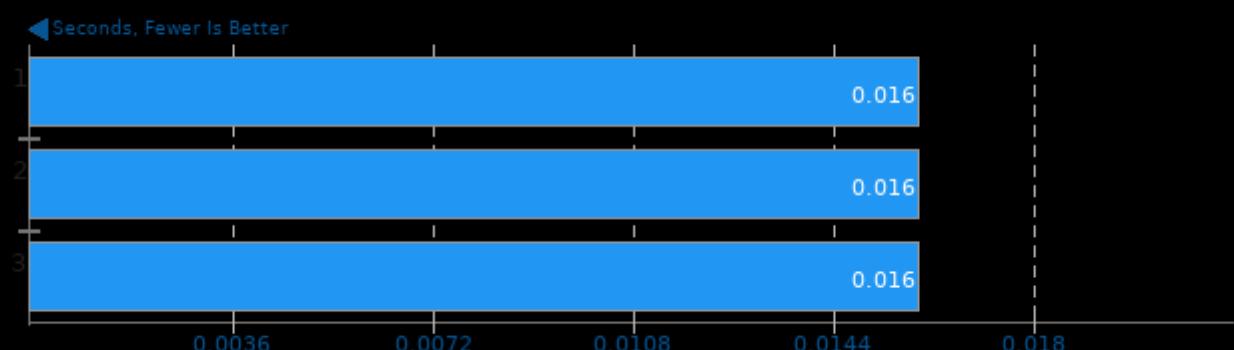
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numpy - Project Size: 65536 - Benchmark: Isonutral Mixing



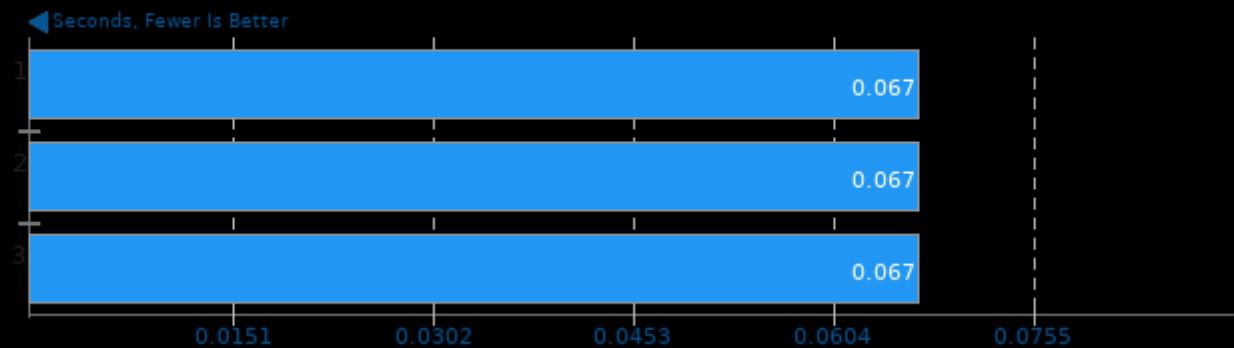
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numba - Project Size: 262144 - Benchmark: Equation of State



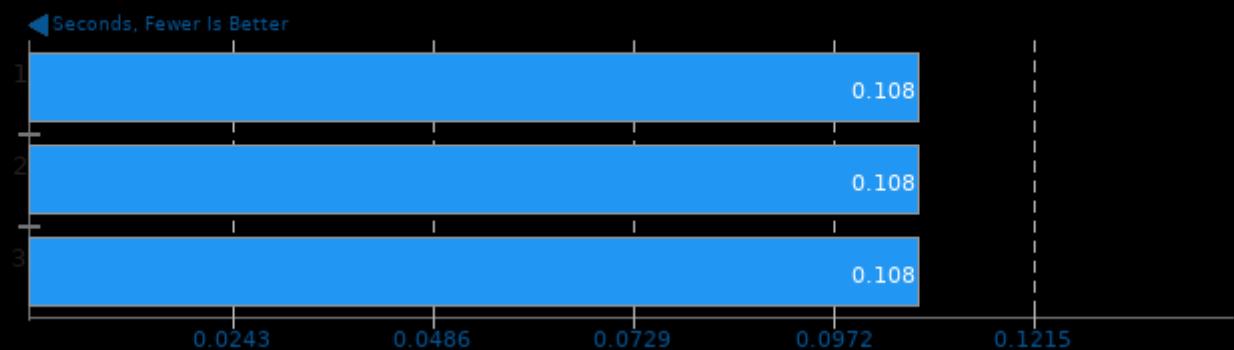
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numba - Project Size: 262144 - Benchmark: Isoneutral Mixing



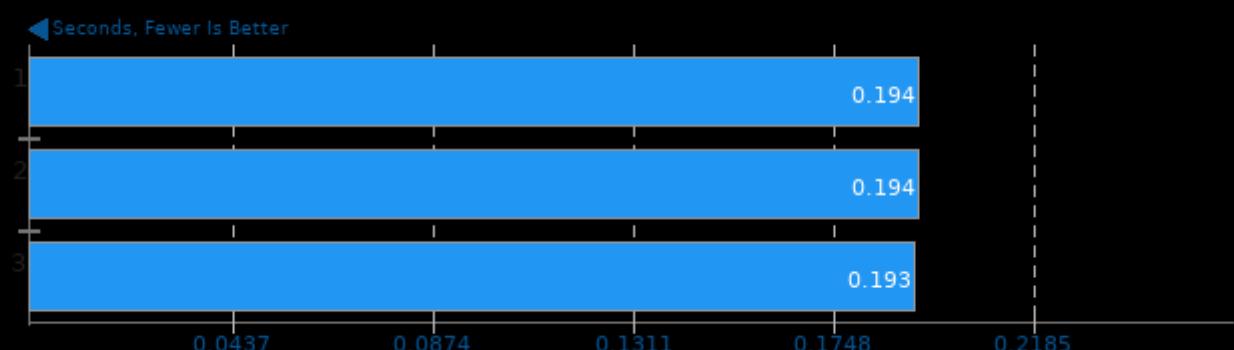
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numpy - Project Size: 262144 - Benchmark: Equation of State



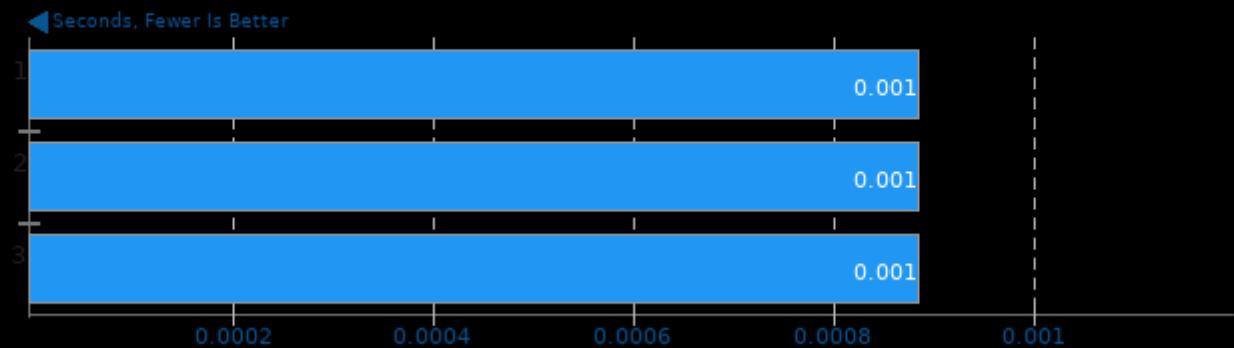
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numpy - Project Size: 262144 - Benchmark: Isoneutral Mixing



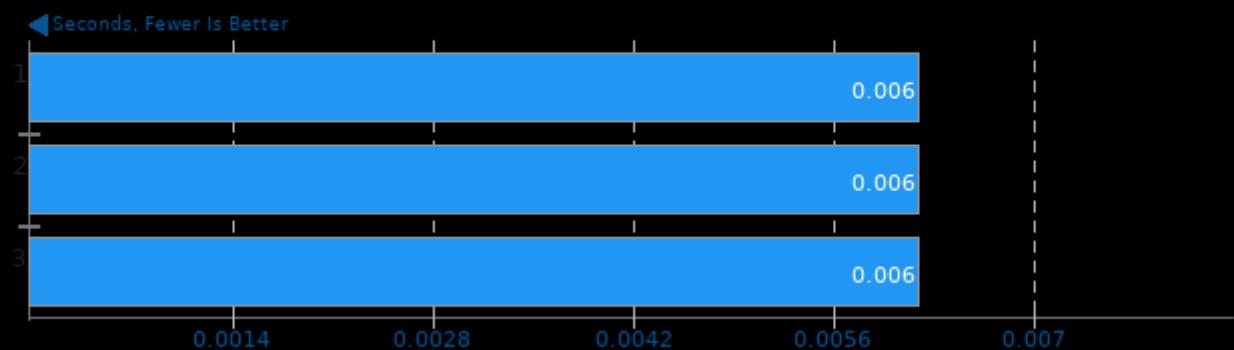
PyHPC Benchmarks 2.1

Device: CPU - Backend: Theano - Project Size: 16384 - Benchmark: Equation of State



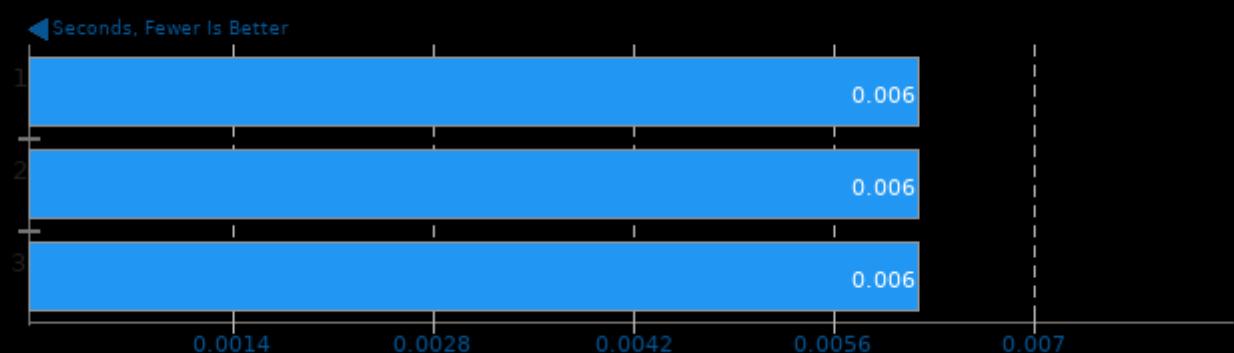
PyHPC Benchmarks 2.1

Device: CPU - Backend: Theano - Project Size: 16384 - Benchmark: Isonutral Mixing



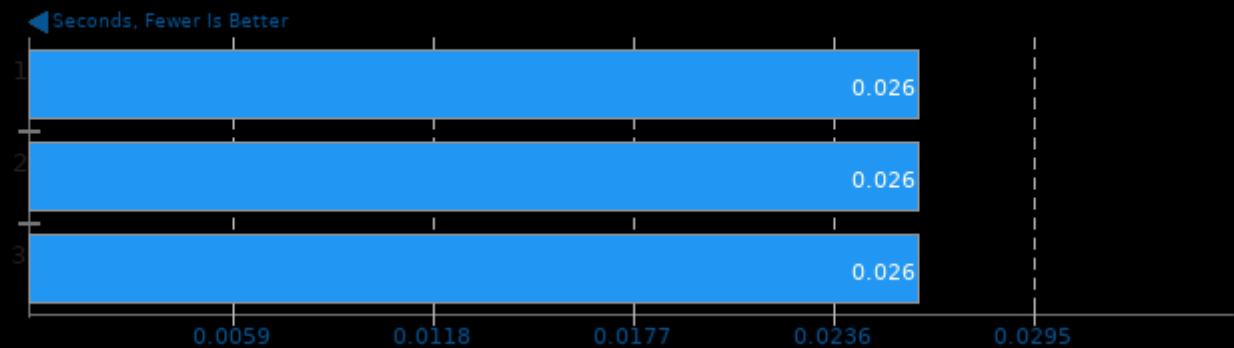
PyHPC Benchmarks 2.1

Device: CPU - Backend: Theano - Project Size: 65536 - Benchmark: Equation of State



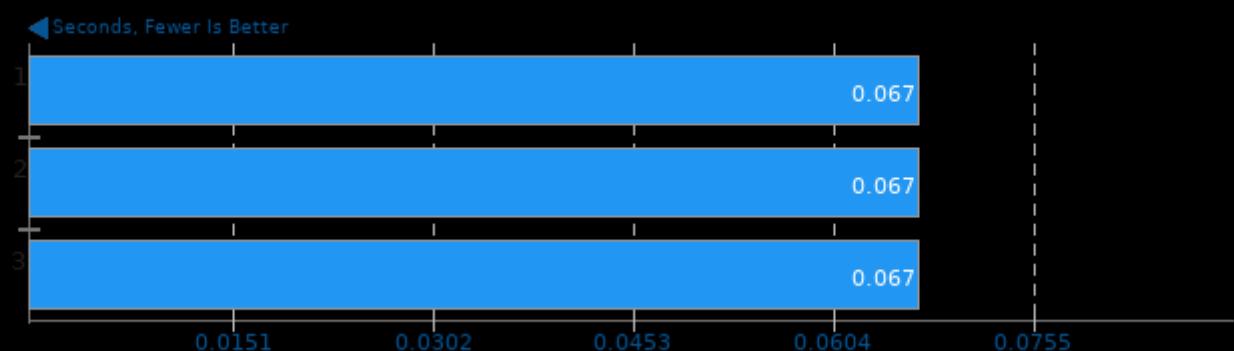
PyHPC Benchmarks 2.1

Device: CPU - Backend: Theano - Project Size: 65536 - Benchmark: Isoneutral Mixing



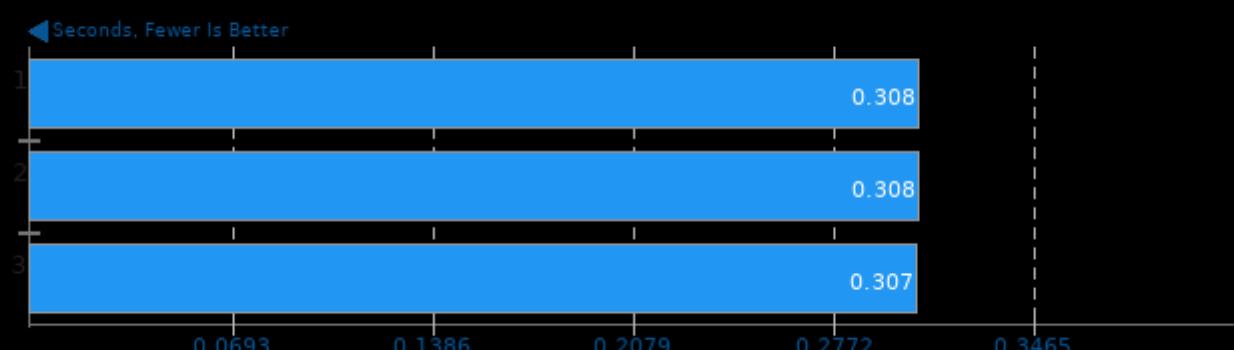
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numba - Project Size: 1048576 - Benchmark: Equation of State



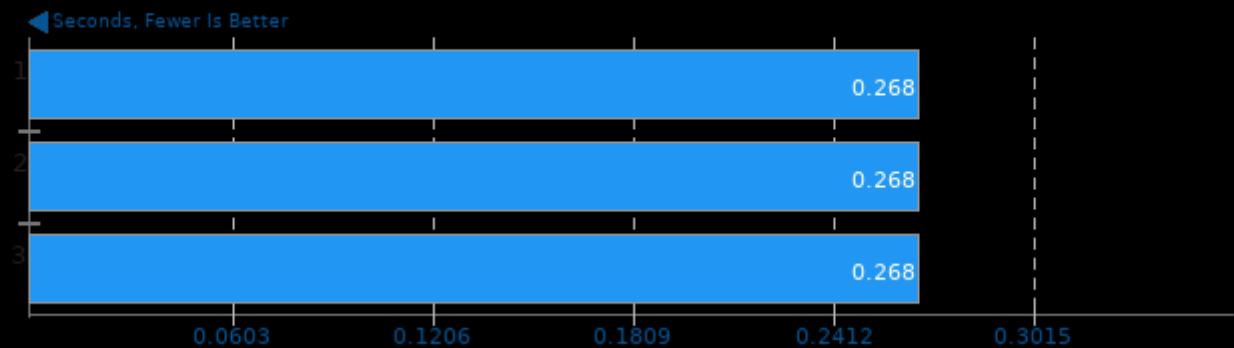
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numba - Project Size: 1048576 - Benchmark: Isoneutral Mixing



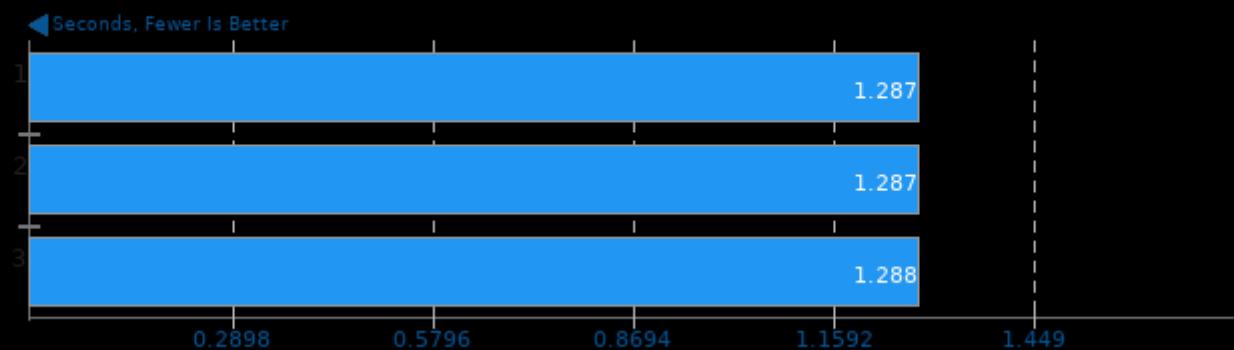
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numba - Project Size: 4194304 - Benchmark: Equation of State



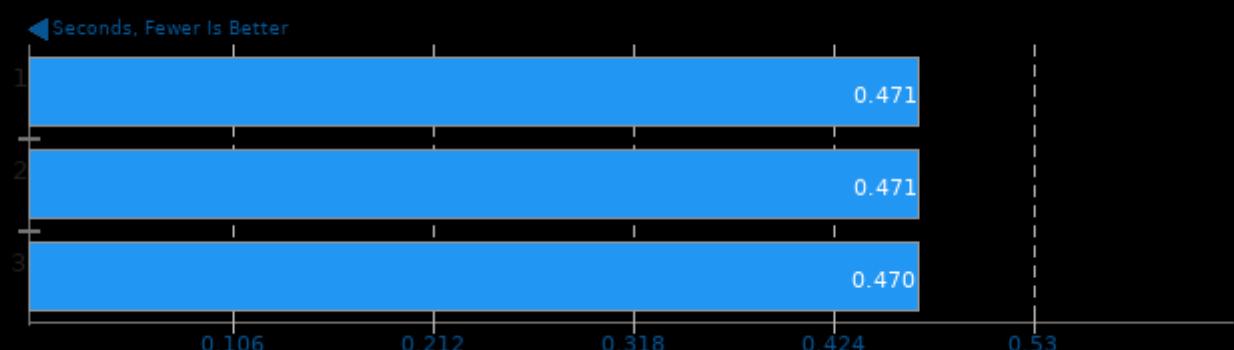
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numba - Project Size: 4194304 - Benchmark: Isoneutral Mixing



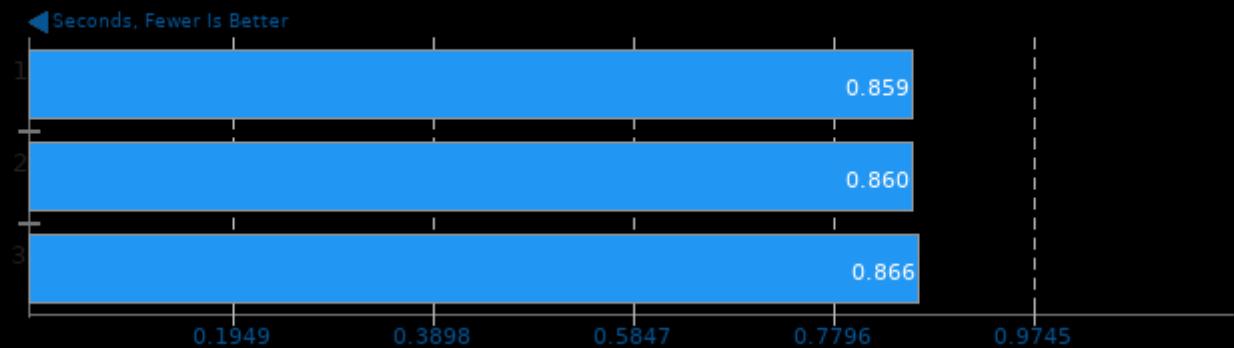
PyHPC Benchmarks 2.1

Device: CPU - Backend: Numpy - Project Size: 1048576 - Benchmark: Equation of State

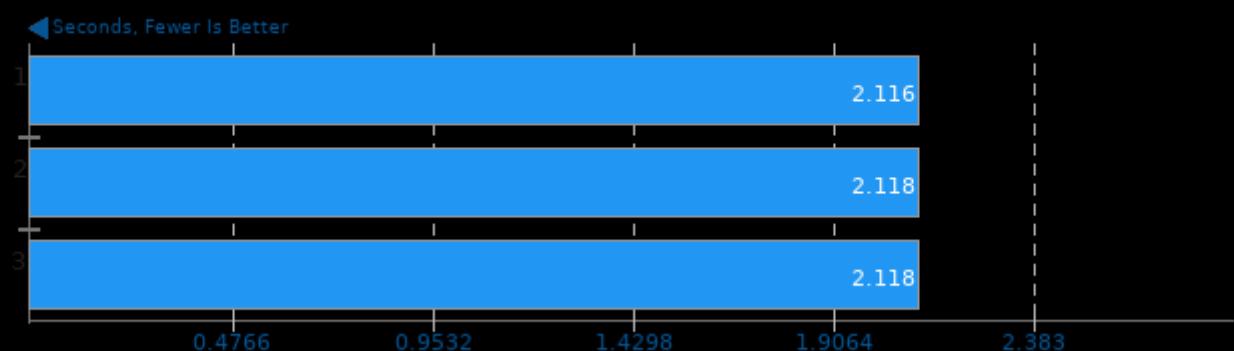


PyHPC Benchmarks 2.1

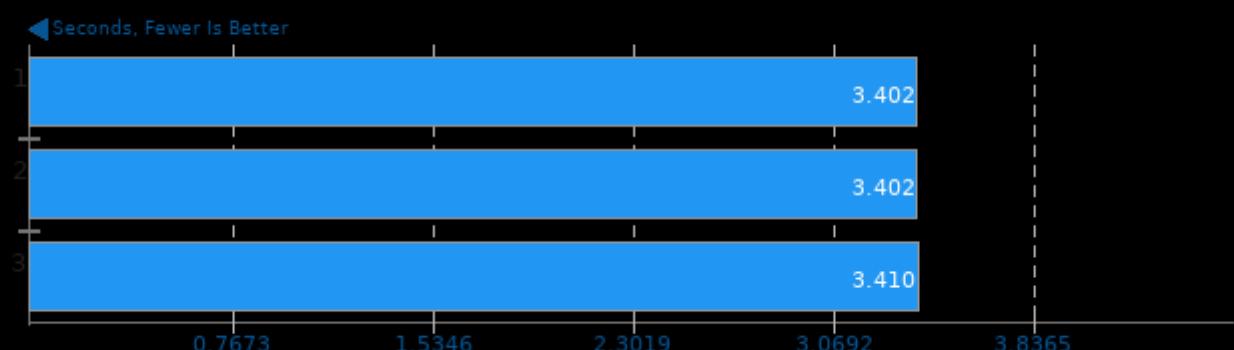
Device: CPU - Backend: Numpy - Project Size: 1048576 - Benchmark: Isoneutral Mixing

**PyHPC Benchmarks 2.1**

Device: CPU - Backend: Numpy - Project Size: 4194304 - Benchmark: Equation of State

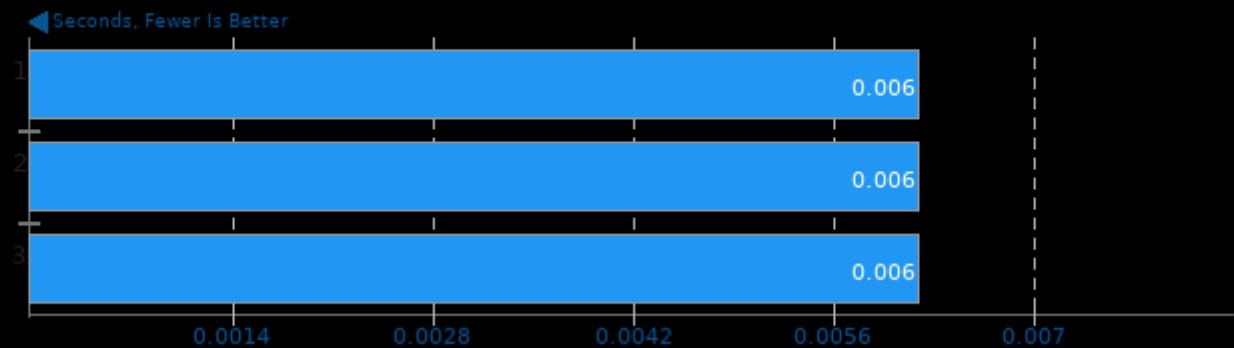
**PyHPC Benchmarks 2.1**

Device: CPU - Backend: Numpy - Project Size: 4194304 - Benchmark: Isoneutral Mixing



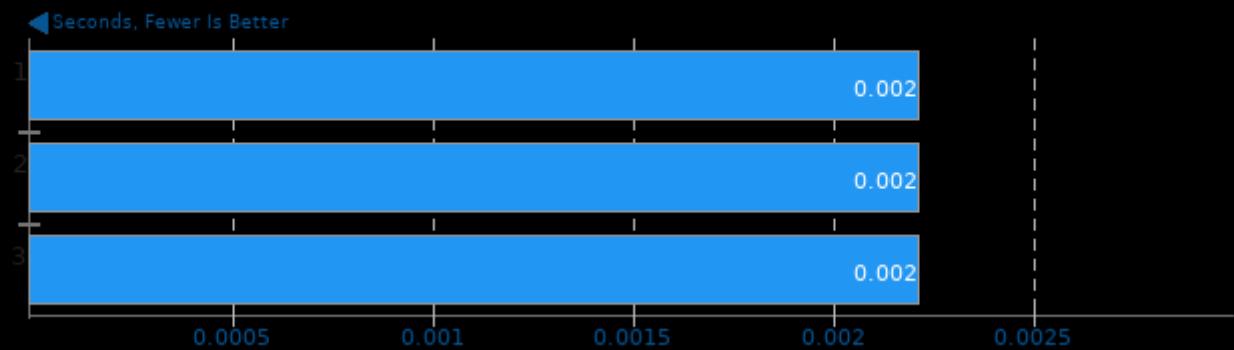
PyHPC Benchmarks 2.1

Device: CPU - Backend: PyTorch - Project Size: 16384 - Benchmark: Isoneutral Mixing



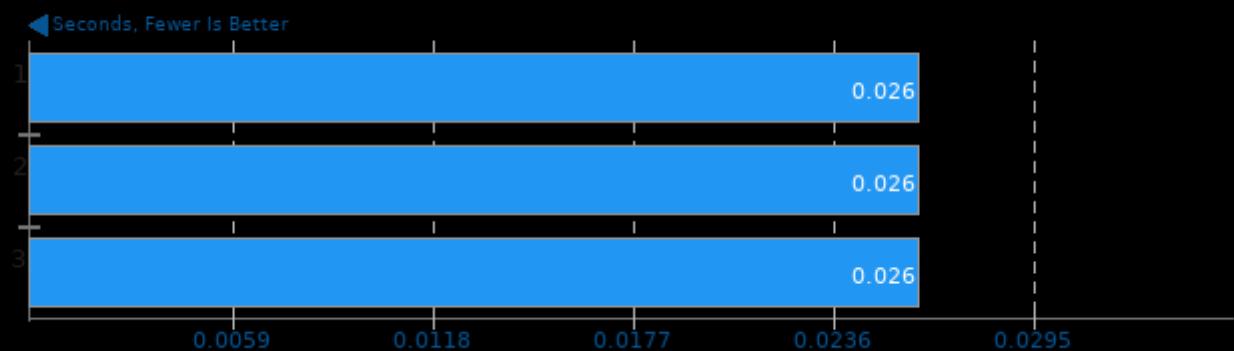
PyHPC Benchmarks 2.1

Device: CPU - Backend: PyTorch - Project Size: 65536 - Benchmark: Equation of State



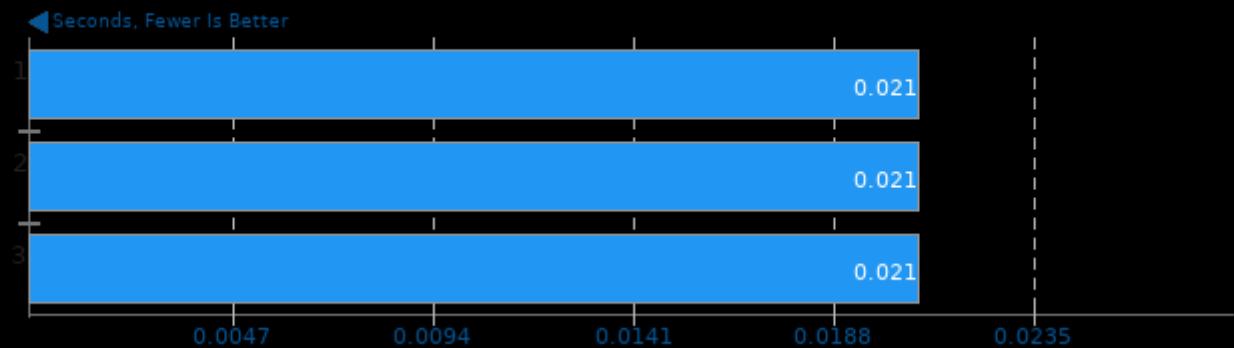
PyHPC Benchmarks 2.1

Device: CPU - Backend: PyTorch - Project Size: 65536 - Benchmark: Isoneutral Mixing



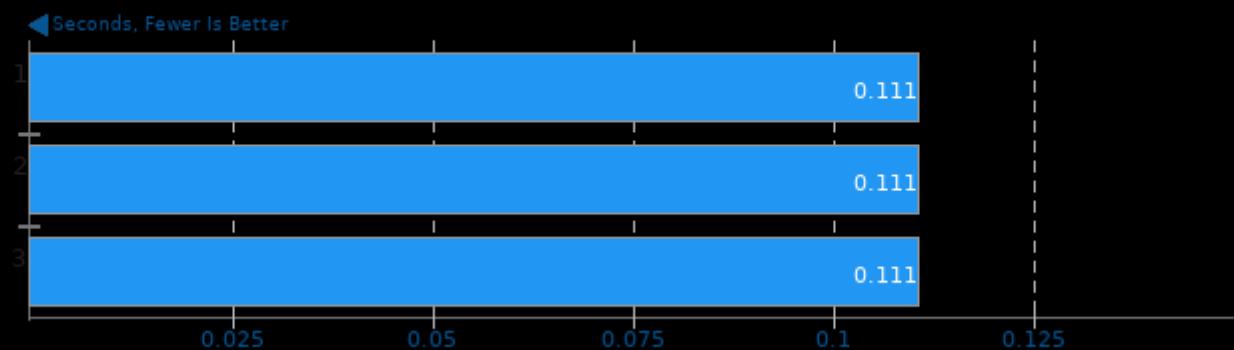
PyHPC Benchmarks 2.1

Device: CPU - Backend: Theano - Project Size: 262144 - Benchmark: Equation of State



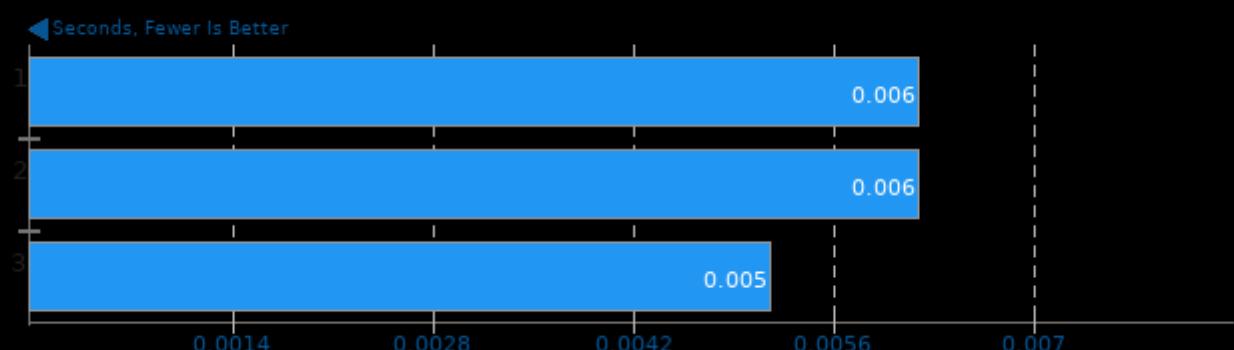
PyHPC Benchmarks 2.1

Device: CPU - Backend: Theano - Project Size: 262144 - Benchmark: Isoneutral Mixing



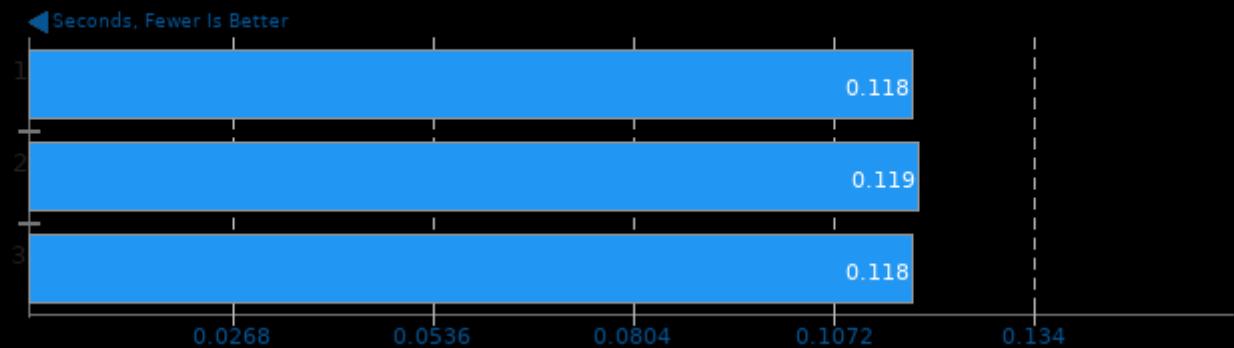
PyHPC Benchmarks 2.1

Device: CPU - Backend: PyTorch - Project Size: 262144 - Benchmark: Equation of State



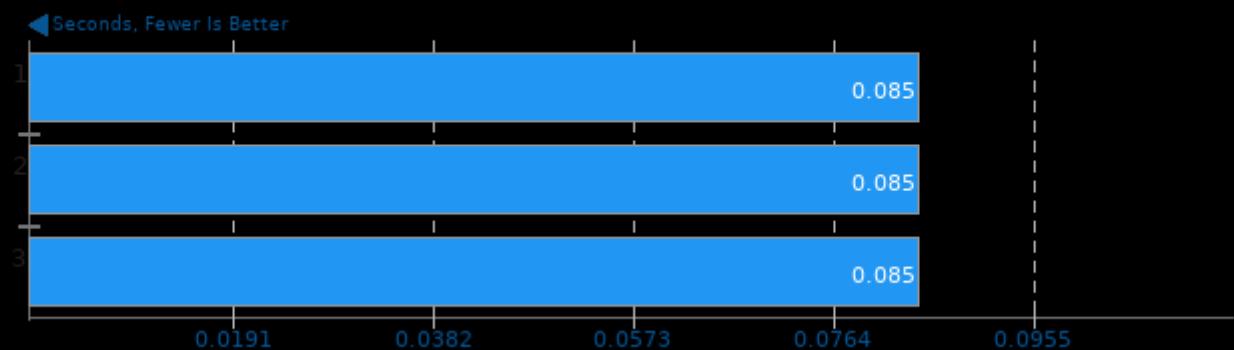
PyHPC Benchmarks 2.1

Device: CPU - Backend: PyTorch - Project Size: 262144 - Benchmark: Isoneutral Mixing



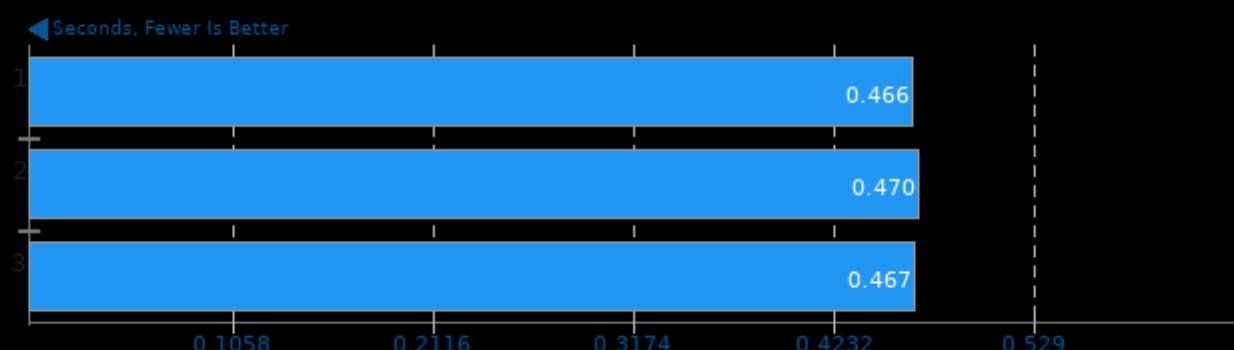
PyHPC Benchmarks 2.1

Device: CPU - Backend: Theano - Project Size: 1048576 - Benchmark: Equation of State



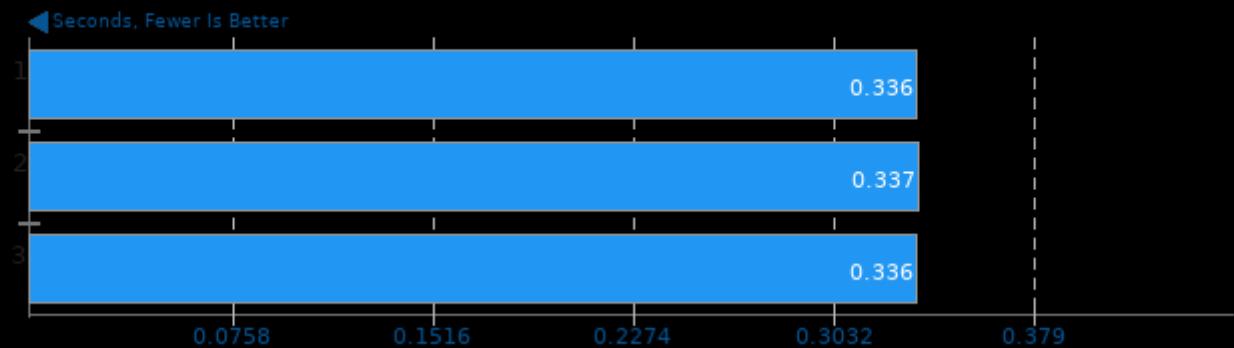
PyHPC Benchmarks 2.1

Device: CPU - Backend: Theano - Project Size: 1048576 - Benchmark: Isoneutral Mixing



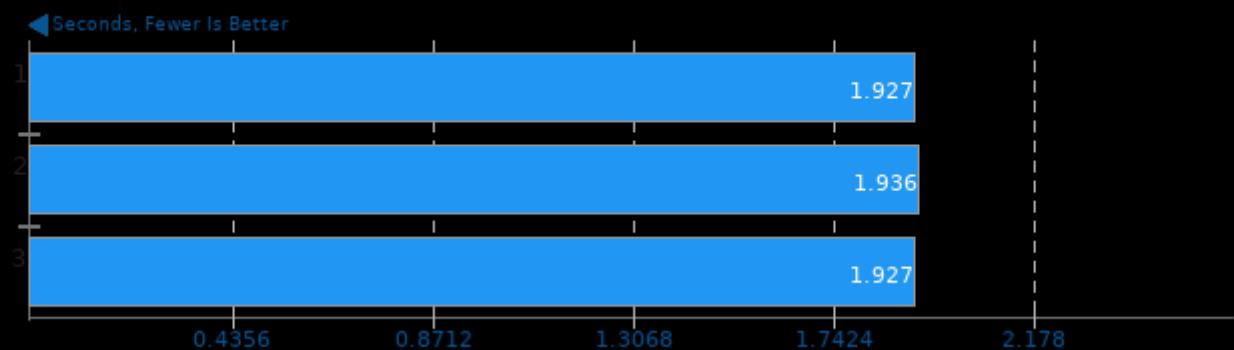
PyHPC Benchmarks 2.1

Device: CPU - Backend: Theano - Project Size: 4194304 - Benchmark: Equation of State



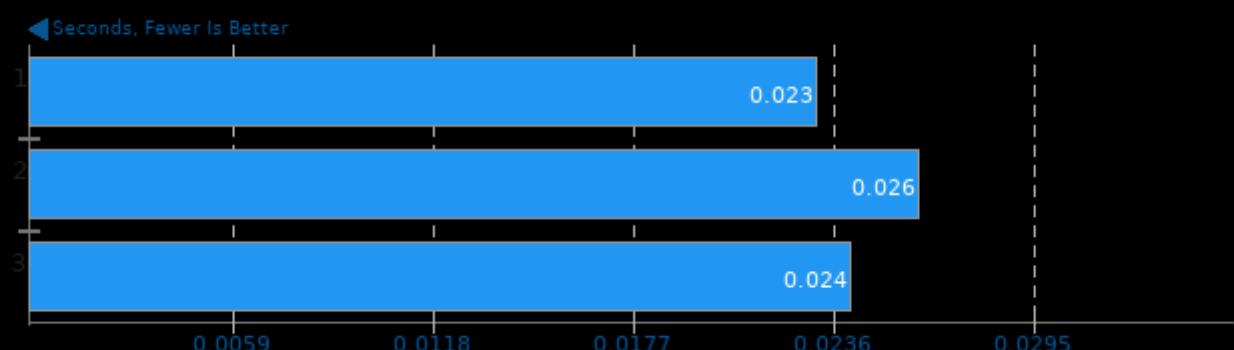
PyHPC Benchmarks 2.1

Device: CPU - Backend: Theano - Project Size: 4194304 - Benchmark: Isoneutral Mixing



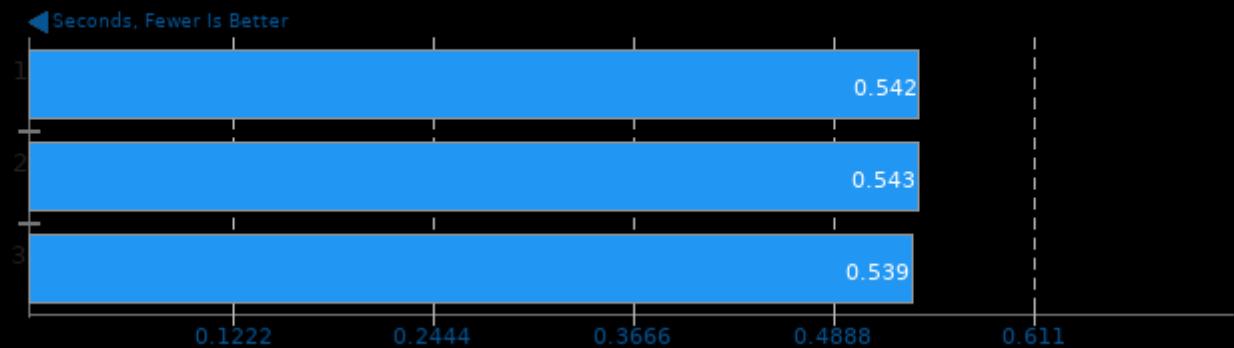
PyHPC Benchmarks 2.1

Device: CPU - Backend: PyTorch - Project Size: 1048576 - Benchmark: Equation of State



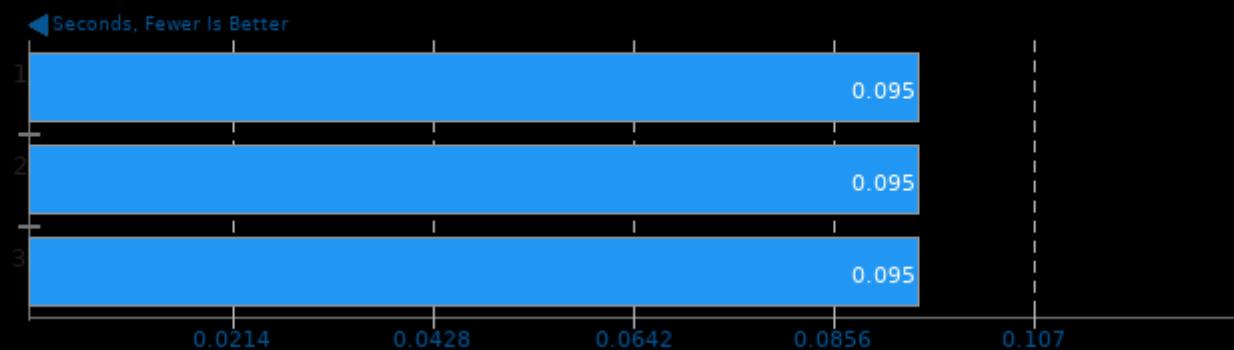
PyHPC Benchmarks 2.1

Device: CPU - Backend: PyTorch - Project Size: 1048576 - Benchmark: Isoneutral Mixing



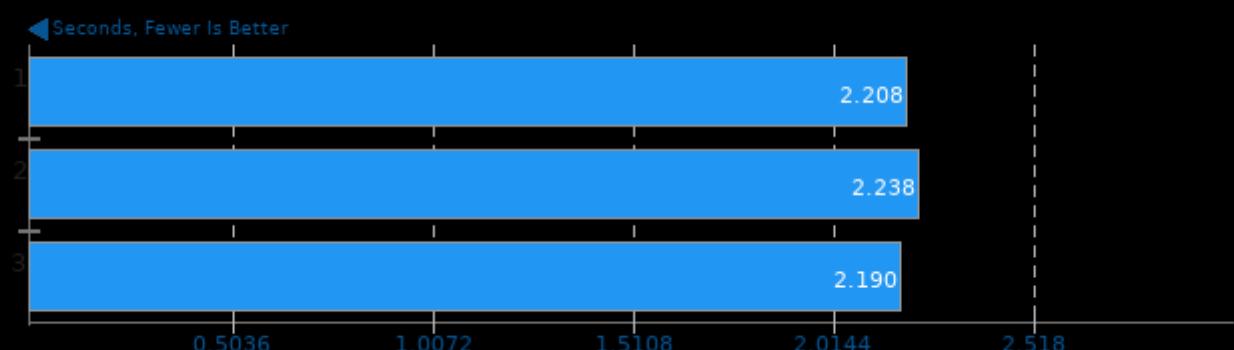
PyHPC Benchmarks 2.1

Device: CPU - Backend: PyTorch - Project Size: 4194304 - Benchmark: Equation of State



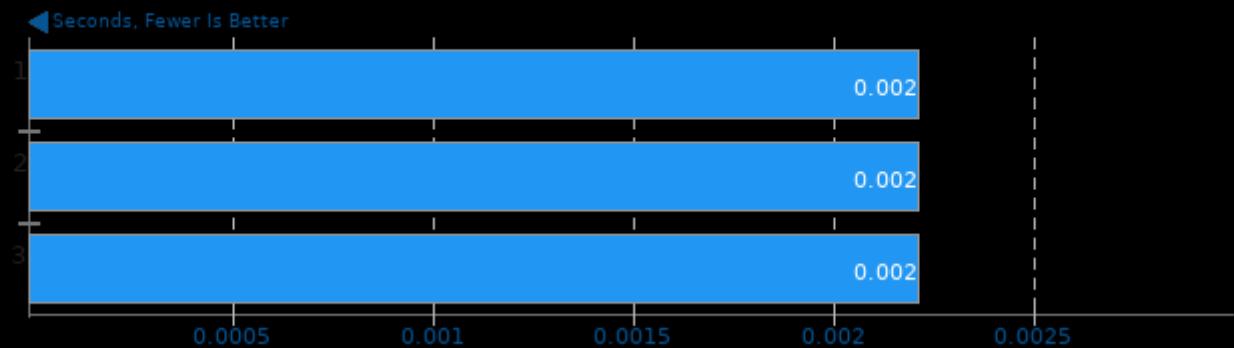
PyHPC Benchmarks 2.1

Device: CPU - Backend: PyTorch - Project Size: 4194304 - Benchmark: Isoneutral Mixing



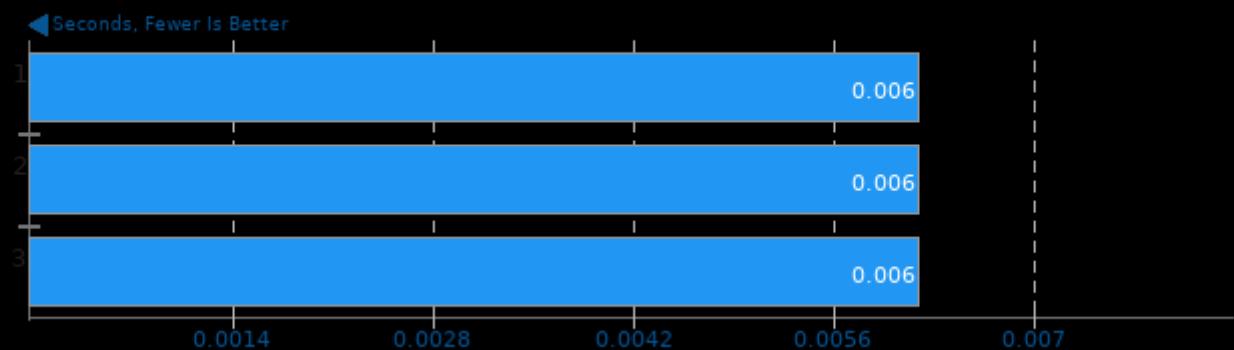
PyHPC Benchmarks 2.1

Device: CPU - Backend: TensorFlow - Project Size: 16384 - Benchmark: Equation of State



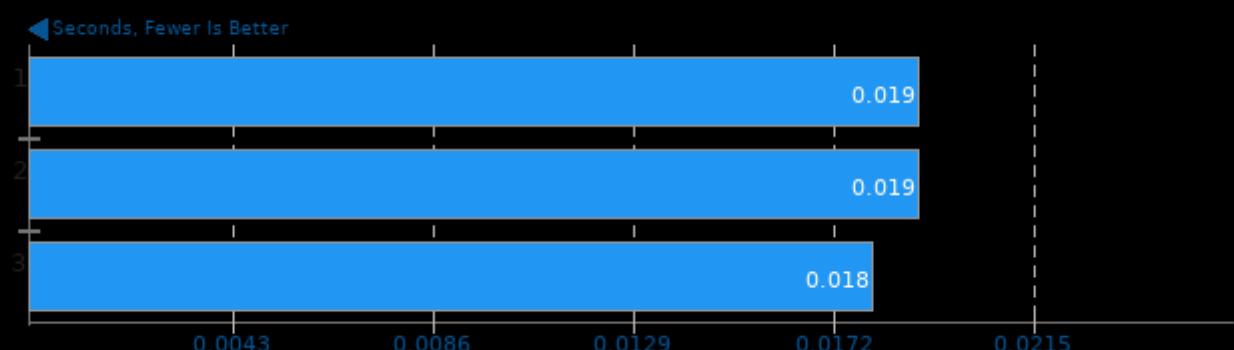
PyHPC Benchmarks 2.1

Device: CPU - Backend: TensorFlow - Project Size: 65536 - Benchmark: Equation of State



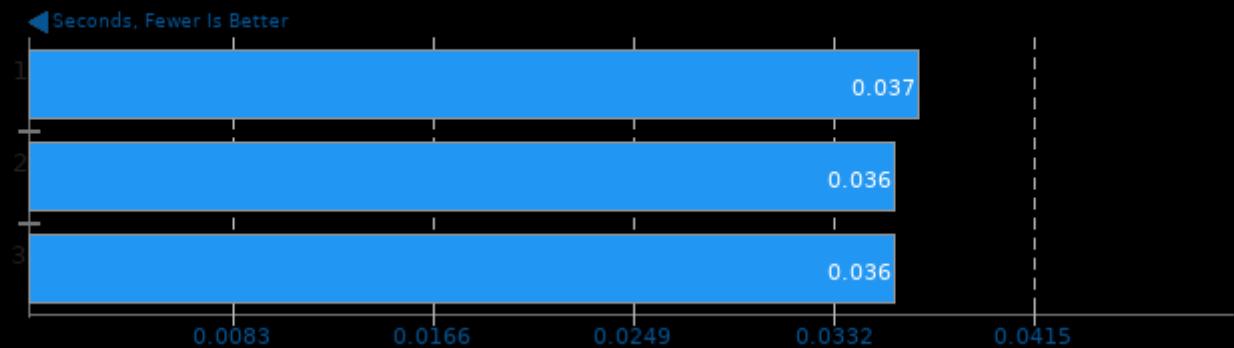
PyHPC Benchmarks 2.1

Device: CPU - Backend: TensorFlow - Project Size: 262144 - Benchmark: Equation of State



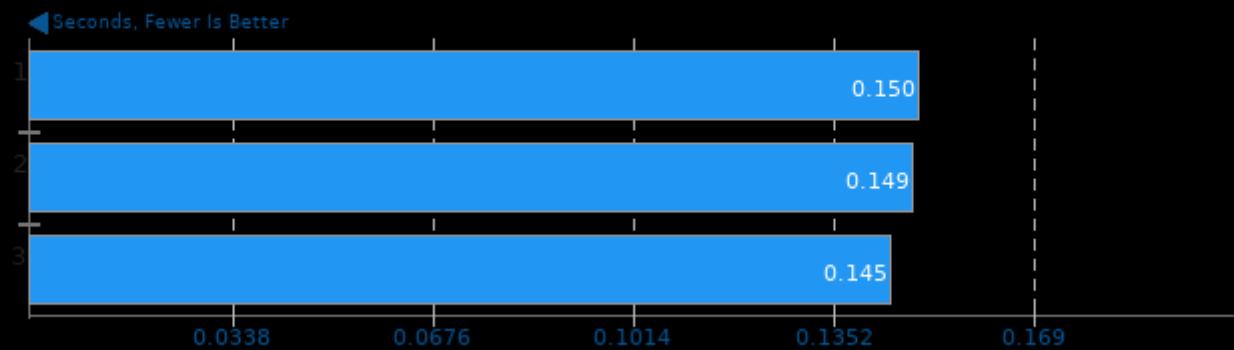
PyHPC Benchmarks 2.1

Device: CPU - Backend: TensorFlow - Project Size: 1048576 - Benchmark: Equation of State



PyHPC Benchmarks 2.1

Device: CPU - Backend: TensorFlow - Project Size: 4194304 - Benchmark: Equation of State



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