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Amazon EC2 Graviton3 Benchmark Comparison

Amazon AWS Graviton3 benchmarks by Michael Larabel.

Automated Executive Summary

c7g.4xlarge Graviton3 had the most wins, coming in first place for 45% of the tests.

Based on the geometric mean of all complete results, the fastest (c7g.4xlarge Graviton3) was 3.188x the speed of the slowest (a1.4xlarge Graviton). c6i.4xlarge Xeon was 0.985x the speed of c7g.4xlarge Graviton3, c6a.4xlarge EPYC was 0.907x the speed of c6i.4xlarge Xeon, c6g.4xlarge Graviton2 was 0.782x the speed of c6a.4xlarge EPYC, a1.4xlarge Graviton was 0.449x the speed of c6g.4xlarge Graviton2.

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

NAS Parallel Benchmarks (Test / Class: LU.C) at 14.908x

LeelaChessZero (Backend: Eigen) at 11.453x

LeelaChessZero (Backend: BLAS) at 10.348x

Stress-NG (Test: Memory Copying) at 8.385x

NAS Parallel Benchmarks (Test / Class: MG.C) at 8.051x

NAS Parallel Benchmarks (Test / Class: CG.C) at 7.85x

NAS Parallel Benchmarks (Test / Class: SP.C) at 7.392x

Zstd Compression (Compression Level: 3 - Compression Speed) at 7.318x

NAS Parallel Benchmarks (Test / Class: FT.C) at 6.977x
High Performance Conjugate Gradient at 6.962x.

Test Systems:

a1.4xlarge Graviton

Processor: ARMv8 Cortex-A72 (16 Cores), Motherboard: Amazon EC2 a1.4xlarge (1.0 BIOS), Chipset: Amazon Device 0200, Memory: 32GB, Disk: 193GB Amazon Elastic Block Store, Network: Amazon Elastic

OS: Ubuntu 22.04, Kernel: 5.15.0-1004-aws (aarch64), Compiler: GCC 11.2.0, File-System: ext4, System Layer: amazon

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale-gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-serialization=2 --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v
Java Notes: OpenJDK Runtime Environment (build 11.0.15+10-Ubuntu-0ubuntu0.22.04.1)
Python Notes: Python 3.10.4

Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Not affected + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Mitigation of Branch predictor hardening BHB + srbd: Not affected + tsx_async_abort: Not affected

c6g.4xlarge Graviton2

Processor: ARMv8 Neoverse-N1 (16 Cores), Motherboard: Amazon EC2 c6g.4xlarge (1.0 BIOS), Chipset: Amazon Device 0200, Memory: 32GB, Disk: 193GB Amazon Elastic Block Store, Network: Amazon Elastic

OS: Ubuntu 22.04, Kernel: 5.15.0-1004-aws (aarch64), Compiler: GCC 11.2.0, File-System: ext4, System Layer: amazon

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale-gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-serialization=2 --enable-multiarch --enable-nls --enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v
Java Notes: OpenJDK Runtime Environment (build 11.0.15+10-Ubuntu-0ubuntu0.22.04.1)
Python Notes: Python 3.10.4

Security Notes: itlb_multihit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Mitigation of CSV2 BHB + srbd: Not affected + tsx_async_abort: Not affected

c7g.4xlarge Graviton3

Processor: ARMv8 Neoverse-V1 (16 Cores), Motherboard: Amazon EC2 c7g.4xlarge (1.0 BIOS), Chipset: Amazon Device 0200, Memory: 32GB, Disk: 193GB Amazon Elastic Block Store, Network: Amazon Elastic

OS: Ubuntu 22.04, Kernel: 5.15.0-1004-aws (aarch64), Compiler: GCC 11.2.0, File-System: ext4, System Layer: amazon

Kernel Notes: Transparent Huge Pages: madvise
Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --enable-bootstrap --enable-checking=release --enable-clocale-gnu --enable-default-pie --enable-fix-cortex-a53-843419 --enable-gnu-unique-object --enable-languages=c,ada,c++,go,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-serialization=2 --enable-multiarch --enable-nls

```
--enable-objc-gc=auto --enable-plugin --enable-shared --enable-threads=posix --host=aarch64-linux-gnu --program-prefix=aarch64-linux-gnu- --target=aarch64-linux-gnu
--with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v
```

Java Notes: OpenJDK Runtime Environment (build 11.0.15+10-Ubuntu-0ubuntu0.22.04.1)

Python Notes: Python 3.10.4

Security Notes: itlb_multithit: Not affected + l1tf: Not affected + mds: Not affected + meltdown: Not affected + spec_store_bypass: Mitigation of SSB disabled via prctl + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Mitigation of CSV2 BHB + srbds: Not affected + tsx_async_abort: Not affected

c6a.4xlarge EPYC

Processor: AMD EPYC 7R13 (8 Cores / 16 Threads), Motherboard: Amazon EC2 c6a.4xlarge (1.0 BIOS), Chipset: Intel 440FX 82441FX PMC, Memory: 32GB, Disk: 193GB Amazon Elastic Block Store, Network: Amazon Elastic

OS: Ubuntu 22.04, Kernel: 5.15.0-1004-aws (x86_64), Compiler: GCC 11.2.0, File-System: ext4, System Layer: amazon

Kernel Notes: Transparent Huge Pages: madvise

```
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-cet --enable-checking=release --enable-clocale=gnu
--enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release
--enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-serialization=2 --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto
--enable-offload-targets=nvptx-none=/build/gcc-11-gBFGDP/gcc-11-11.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-11-gBFGDP/gcc-11-11.2.0/debian/tmp-gcn/usr
--enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64
--with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32
--with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
```

Processor Notes: CPU Microcode: 0xa001144

Java Notes: OpenJDK Runtime Environment (build 11.0.15+10-Ubuntu-0ubuntu0.22.04.1)

Python Notes: Python 3.10.4

Security Notes: itlb_multithit: 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 Retpolines IBPB: conditional IBRS_FW STIBP: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

c6i.4xlarge Xeon

Processor: Intel Xeon Platinum 8375C (8 Cores / 16 Threads), Motherboard: Amazon EC2 c6i.4xlarge (1.0 BIOS), Chipset: Intel 440FX 82441FX PMC, Memory: 32GB, Disk: 193GB Amazon Elastic Block Store, Network: Amazon Elastic

OS: Ubuntu 22.04, Kernel: 5.15.0-1004-aws (x86_64), Compiler: GCC 11.2.0, File-System: ext4, System Layer: amazon

Kernel Notes: Transparent Huge Pages: madvise

```
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --enable-cet --enable-checking=release --enable-clocale=gnu
--enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,m2 --enable-libphobos-checking=release
--enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-link-serialization=2 --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto
--enable-offload-targets=nvptx-none=/build/gcc-11-gBFGDP/gcc-11-11.2.0/debian/tmp-nvptx/usr,amdgcn-amdhsa=/build/gcc-11-gBFGDP/gcc-11-11.2.0/debian/tmp-gcn/usr
--enable-plugin --enable-shared --enable-threads=posix --host=x86_64-linux-gnu --program-prefix=x86_64-linux-gnu- --target=x86_64-linux-gnu --with-abi=m64
--with-arch-32=i686 --with-build-config=bootstrap-lto-lean --with-default-libstdcxx-abi=new --with-gcc-major-version-only --with-multilib-list=m32,m64,mx32
--with-target-system-zlib=auto --with-tune=generic --without-cuda-driver -v
```

Processor Notes: CPU Microcode: 0xd000331

Java Notes: OpenJDK Runtime Environment (build 11.0.15+10-Ubuntu-0ubuntu0.22.04.1)

Python Notes: Python 3.10.4

Security Notes: itlb_multithit: 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 Enhanced IBRS IBPB: conditional RSB filling + srbds: Not affected + tsx_async_abort: Not affected

	a1.4xlarge Graviton	c6g.4xlarge Graviton2	c7g.4xlarge Graviton3	c6a.4xlarge EPYC	c6i.4xlarge Xeon
High Performance Conjugate Gradient (GFLOP/s)	3.77834	19.7218	26.3058	5.06042	8.66031
Normalized	14.36%	74.97%	100%	19.24%	32.92%
Standard Deviation	0%	0.1%	0.2%	0.1%	0.8%

Amazon EC2 Graviton3 Benchmark Comparison

NAS Parallel Benchmarks - BT.C	3148	6449	10340	13134	13888
	(Mop/s)				
Normalized	22.67%	46.44%	74.45%	94.57%	100%
Standard Deviation	0.2%	0.1%	0.1%	1.3%	0.3%
NAS Parallel Benchmarks - CG.C	1213	3521	6572	6169	9523
	(Mop/s)				
Normalized	12.74%	36.97%	69.01%	64.78%	100%
Standard Deviation	2.4%	0.5%	0.5%	2.3%	1.2%
NAS Parallel Benchmarks - EP.D	339.20	558.88	934.72	466.21	1103
	(Mop/s)				
Normalized	30.75%	50.66%	84.73%	42.26%	100%
Standard Deviation	0.1%	0.1%	0.1%	0%	5.4%
NAS Parallel Benchmarks - FT.C	2927	6244	11792	18300	20424
	(Mop/s)				
Normalized	14.33%	30.57%	57.74%	89.6%	100%
Standard Deviation	0.1%	0%	0%	0.4%	0.3%
NAS Parallel Benchmarks - IS.D	197.57	372.76	1042	541.35	861.57
	(Mop/s)				
Normalized	18.96%	35.78%	100%	51.96%	82.69%
Standard Deviation	0.3%	0.1%	0.4%	0.1%	0.4%
NAS Parallel Benchmarks - LU.C	2558	5134	7730	25141	38137
	(Mop/s)				
Normalized	6.71%	13.46%	20.27%	65.92%	100%
Standard Deviation	0%	0%	0%	0.1%	0.7%
NAS Parallel Benchmarks - MG.C	3266	6721	13482	16826	26299
	(Mop/s)				
Normalized	12.42%	25.56%	51.26%	63.98%	100%
Standard Deviation	0.1%	0%	0.1%	0.3%	1.2%
NAS Parallel Benchmarks - SP.C	1294	2356	4467	8095	9563
	(Mop/s)				
Normalized	13.53%	24.64%	46.71%	84.65%	100%
Standard Deviation	0.3%	0%	0.4%	0.5%	1.3%
LeelaChessZero - BLAS	135	864	1103	1091	1397
Normalized	9.66%	61.85%	78.95%	78.1%	100%
Standard Deviation	1.1%	2.4%	1%	3.5%	2.7%
LeelaChessZero - Eigen	128	834	1189	1001	1466
Normalized	8.73%	56.89%	81.11%	68.28%	100%
Standard Deviation	0.9%	2.5%	1.4%	3.5%	1.6%
Rodinia - OpenMP LavaMD (sec)	360.304	215.666	143.334	224.331	281.389
	(sec)				
Normalized	39.78%	66.46%	100%	63.89%	50.94%
Standard Deviation	0%	0%	0.2%	0%	0.1%
Rodinia - OpenMP CFD Solver	41.450	17.035	10.478	21.789	20.446
	(sec)				
Normalized	25.28%	61.51%	100%	48.09%	51.25%
Standard Deviation	0.3%	0.5%	0.4%	0.7%	0.2%
Rodinia - O.S (sec)	47.430	15.484	13.296	18.383	23.512
	(sec)				
Normalized	28.03%	85.87%	100%	72.33%	56.55%
Standard Deviation	0.1%	6.6%	8.6%	0.5%	0.5%
Algebraic Multi-Grid Benchmark	186716933	932652900	1258807333	267670700	661364767
	(Figure Of Merit)				
Normalized	14.83%	74.09%	100%	21.26%	52.54%
Standard Deviation	0.2%	0.6%	0.1%	0.1%	1.3%

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Timed MrBayes Analysis - P.P.A	644.788	384.753	251.397	120.636	134.924
(sec)					
Normalized	18.71%	31.35%	47.99%	100%	89.41%
Standard Deviation	0.1%	0.1%	0.2%	0.5%	1.8%
Xcompact3d Incompact3d - i.i.1.C.P.D	53.7706274	11.5733547	8.01671425	28.2797661	17.8682772
(sec)					
Normalized	14.91%	69.27%	100%	28.35%	44.87%
Standard Deviation	0.1%	0.2%	0.3%	0.2%	0.9%
Xcompact3d Incompact3d - i.i.1.C.P.D	182.583939	41.0240835	29.1258570	110.770027	69.2169978
(sec)					
Normalized	15.95%	71%	100%	26.29%	42.08%
Standard Deviation	0.1%	0.1%	0.2%	0.2%	0.3%
LAMMPS Molecular Dynamics Simulator - Rhodopsin Protein	3.245	7.935	11.291	5.067	6.220
(ns/day)					
Normalized	28.74%	70.28%	100%	44.88%	55.09%
Standard Deviation	2.1%	0.3%	0.9%	2.7%	0.2%
LULESH (z/s)	2328	6016	10941	5452	8112
Normalized	21.28%	54.99%	100%	49.83%	74.15%
Standard Deviation	0.5%	0.1%	1.2%	0.2%	0.3%
WebP Image Encode - Q.1.L	61.801	31.082	22.769	26.708	21.122
(Encode Time - sec)					
Normalized	34.18%	67.96%	92.77%	79.08%	100%
Standard Deviation	0.2%	0.1%	0.7%	2.5%	0.3%
WebP Image Encode - Q.1.L.H.C	124.708	66.147	48.208	48.677	41.805
(Encode Time - sec)					
Normalized	33.52%	63.2%	86.72%	85.88%	100%
Standard Deviation	0.1%	0%	0%	0.2%	1.4%
simdjson - Kostya (GB/s)	0.63	1.19	1.94	2.80	2.46
Normalized	22.5%	42.5%	69.29%	100%	87.86%
Standard Deviation	0%	0%	0%	0.2%	0.2%
simdjson - LargeRand (GB/s)	0.3	0.49	0.7	0.95	0.86
Normalized	31.58%	51.58%	73.68%	100%	90.53%
Standard Deviation	0%	1.2%	0%	0%	0%
simdjson - PartialTweets (GB/s)	0.78	1.51	2.62	3.64	3.71
Normalized	21.02%	40.7%	70.62%	98.11%	100%
Standard Deviation	0%	0%	0%	0.2%	0.2%
simdjson - DistinctUserID (GB/s)	0.8	1.53	2.69	4.30	4.30
Normalized	18.6%	35.58%	62.56%	100%	100%
Standard Deviation	0%	0%	0%	0.3%	0.1%
DaCapo Benchmark - H2 (msec)	6740	3964	2951	3019	2921
(msec)					
Normalized	43.34%	73.69%	98.98%	96.75%	100%
Standard Deviation	1.9%	2.3%	2.5%	1.8%	2.3%
DaCapo Benchmark - Jython	12997	5626	3940	4616	4013
(msec)					
Normalized	30.31%	70.03%	100%	85.36%	98.18%
Standard Deviation	0.7%	0.8%	0.4%	1%	1.2%
DaCapo Benchmark - Tradesoap	11182	4506	3524	4052	3815
(msec)					
Normalized	31.51%	78.21%	100%	86.97%	92.37%
Standard Deviation	1.3%	1.2%	0.8%	0.8%	1.3%

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DaCapo Benchmark - Tradebeans (msec)	9045	4344	3203	3167	2928
Normalized	32.37%	67.4%	91.41%	92.45%	100%
Standard Deviation	1%	1.8%	1.7%	2.5%	2.9%
Zstd Compression - 3 - Compression Speed (MB/s)	633.9	2888	4639	2784	3441
Normalized	13.66%	62.26%	100%	60.01%	74.17%
Standard Deviation	1.2%	0.4%	0.4%	0.2%	1.5%
Zstd Compression - 19 - Compression Speed (MB/s)	16.9	34.6	41.2	30.0	38.1
Normalized	41.02%	83.98%	100%	72.82%	92.48%
Standard Deviation	0.3%	0.3%	0%	1.2%	1.8%
Zstd Compression - 19 - D.S. (MB/s)	1122	2052	3050	2908	2582
Normalized	36.77%	67.26%	100%	95.32%	84.65%
Standard Deviation	0.7%	1%	0.4%	0.2%	1.6%
Zstd Compression - 19, Long Mode - Compression Speed	16	31.0	39.5	25.9	33.8
Normalized	40.51%	78.48%	100%	65.57%	85.57%
Standard Deviation	0%	0.2%	1%	1.8%	0.5%
Zstd Compression - 19, Long Mode - D.S (MB/s)	1214	2196	3241	2826	2666
Normalized	37.46%	67.77%	100%	87.21%	82.27%
Standard Deviation	2.2%	0.2%	0.4%	0.4%	0.5%
TSCP - A.C.P (Nodes/s)	538500	872313	1370094	1442631	1272596
Normalized	37.33%	60.47%	94.97%	100%	88.21%
Standard Deviation	0.1%	0.1%	0%	0.6%	0.2%
ACES DGEMM - S.F.P.R (GFLOP/s)	0.891391	4.785123	5.853864	2.432432	2.230545
Normalized	15.23%	81.74%	100%	41.55%	38.1%
Standard Deviation	0.5%	0.3%	0.5%	2.3%	0.3%
Coremark - CoreMark Size 666 - I.P.S (Iterations/Sec)	203869	315464	405414	345133	285379
Normalized	50.29%	77.81%	100%	85.13%	70.39%
Standard Deviation	0.1%	0%	1.4%	1.1%	0%
7-Zip Compression - 7-Zip Compression - D.R (MIPS)	32498	71285	97824	62562	66631
Normalized	33.22%	72.87%	100%	63.95%	68.11%
Standard Deviation	0.5%	0.1%	0.3%	0%	0.5%
Stockfish - Total Time (Nodes/s)	10980430	21679245	27608891	23857623	22081961
Normalized	39.77%	78.52%	100%	86.41%	79.98%
Standard Deviation	2%	2.3%	1%	1.1%	1.9%
asmFish - 1.H.M.2.D (Nodes/s)	15331550	26540482	32134123	26187688	23746200
Normalized	47.71%	82.59%	100%	81.49%	73.9%
Standard Deviation	1.2%	2.3%	0.6%	2%	2.4%
libavif avifenc - 0 (sec)	768.302	406.937	256.841	195.532	204.994
Normalized	25.45%	48.05%	76.13%	100%	95.38%
Standard Deviation	0.1%	0.1%	0.1%	0.5%	0.3%
libavif avifenc - 2 (sec)	449.022	238.205	141.698	93.946	97.735
Normalized	20.92%	39.44%	66.3%	100%	96.12%
Standard Deviation	0.1%	0.1%	0.1%	0.8%	0.5%

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libavif avifenc - 6, Lossless (sec)	33.991	16.518	11.908	16.394	17.529
Normalized	35.03%	72.09%	100%	72.64%	67.93%
Standard Deviation	1.6%	1.8%	0.2%	1.2%	0.3%
Timed Apache Compilation - Time To Compile (sec)	74.742	34.201	26.940	23.532	22.527
Normalized	30.14%	65.87%	83.62%	95.73%	100%
Standard Deviation	0%	0.1%	0.3%	0.5%	0.4%
Timed Gem5 Compilation - Time To Compile (sec)	1156	488.805	391.171	515.201	469.940
Normalized	33.85%	80.03%	100%	75.93%	83.24%
Standard Deviation	0.1%	0.2%	0.6%	0.3%	0.2%
Timed ImageMagick Compilation - Time To Compile (sec)	93.632	40.333	27.904	32.626	29.737
Normalized	29.8%	69.18%	100%	85.53%	93.84%
Standard Deviation	0.5%	0.9%	0.8%	0.3%	0.4%
Timed LLVM Compilation - Ninja (sec)	1785	682.981	544.929	760.344	685.704
Normalized	30.54%	79.79%	100%	71.67%	79.47%
Standard Deviation	0%	0.1%	1.7%	0%	0%
Timed Node.js Compilation - Time To Compile (sec)	1766	628.401	497.579	664.347	604.620
Normalized	28.18%	79.18%	100%	74.9%	82.3%
Standard Deviation	0.2%	0.1%	0.7%	0.1%	0.1%
Timed PHP Compilation - Time To Compile (sec)	196.029	88.897	69.483	67.084	64.337
Normalized	32.82%	72.37%	92.59%	95.91%	100%
Standard Deviation	0.1%	0.6%	0.3%	0.1%	0.2%
Build2 - Time To Compile (sec)	353.912	142.277	115.020	150.994	136.801
Normalized	32.5%	80.84%	100%	76.18%	84.08%
Standard Deviation	0.9%	0.9%	1%	1%	0.9%
C-Ray - Total Time - 4.1.R.P.P (sec)	104.761	62.323	38.517	69.349	92.545
Normalized	36.77%	61.8%	100%	55.54%	41.62%
Standard Deviation	7.4%	0.1%	0.1%	2.5%	0.1%
POV-Ray - Trace Time (sec)	93.801	51.047	37.863	49.435	52.784
Normalized	40.37%	74.17%	100%	76.59%	71.73%
Standard Deviation	3.9%	0%	0.1%	0.6%	0.4%
m-queens - Time To Solve (sec)	110.368	75.224	66.822	72.330	91.231
Normalized	60.54%	88.83%	100%	92.38%	73.24%
Standard Deviation	0%	0%	0%	0%	0.1%
N-Queens - Elapsed Time (sec)	32.285	23.136	21.536	16.378	18.839
Normalized	50.73%	70.79%	76.05%	100%	86.94%
Standard Deviation	0%	0%	0%	0%	0%
Ngspice - C2670 (sec)	473.901	263.724	198.224	245.886	147.893
Normalized	31.21%	56.08%	74.61%	60.15%	100%
Standard Deviation	1.3%	0.6%	0.8%	0.8%	2.4%
Ngspice - C7552 (sec)	480.793	255.205	191.286	180.356	161.081
Normalized	33.5%	63.12%	84.21%	89.31%	100%
Standard Deviation	0.4%	2.5%	1.8%	0.6%	0.4%
Google SynthMark - VoiceMark_100 (Voices)	331.070	470.389	675.635	663.073	565.690
Normalized	49%	69.62%	100%	98.14%	83.73%
Standard Deviation	0%	0.1%	0.1%	1.9%	0.6%

Amazon EC2 Graviton3 Benchmark Comparison

SecureMark - SecureMark-TLS (marks)	74356	120301	183708	213288	230549
Normalized	32.25%	52.18%	79.68%	92.51%	100%
Standard Deviation	0.1%	0%	0.7%	4.7%	0.6%
OpenSSL - SHA256 (byte/s)	6785689517	10723184083	13722045973	11691403353	7096993937
Normalized	49.45%	78.15%	100%	85.2%	51.72%
Standard Deviation	0.3%	0.8%	0.1%	0.1%	0%
OpenSSL - RSA4096 (sign/s)	588.3	660.6	2546	2089	2161
Normalized	23.1%	25.94%	100%	82.03%	84.88%
Standard Deviation	0%	0%	0%	0.1%	0.4%
OpenSSL - RSA4096 (verify/s)	45329	53952	178460	136784	140964
Normalized	25.4%	30.23%	100%	76.65%	78.99%
Standard Deviation	0.2%	0%	0.1%	0.1%	0.1%
Liquid-DSP - 16 - 256 - 57 (samples/s)	165513333	262890000	3836066667	5097466667	373100000
Normalized	32.47%	51.57%	75.25%	100%	73.19%
Standard Deviation	0%	0%	0.2%	0.2%	0%
GROMACS - MPI CPU - water_GMX50_bare (Ns/Day)	0.316	0.781	1.128	1.004	1.452
Normalized	21.76%	53.79%	77.69%	69.15%	100%
Standard Deviation	0%	0.1%	0.3%	0.4%	0.1%
TensorFlow Lite - SqueezeNet	12015	3969	3258	3103	2984
Normalized	24.84%	75.17%	91.59%	96.16%	100%
Standard Deviation	0.7%	1.6%	1.2%	0.1%	0.2%
TensorFlow Lite - Inception V4	188910	46794	41855	44921	41186
Normalized	21.8%	88.02%	98.4%	91.69%	100%
Standard Deviation	1.6%	0.7%	0.9%	0.2%	0.3%
TensorFlow Lite - NASNet Mobile (us)	30987	14985	11592	9267	10901
Normalized	29.91%	61.84%	79.94%	100%	85.01%
Standard Deviation	0.3%	5.3%	4.1%	0.4%	5.7%
TensorFlow Lite - Mobilenet Float (us)	9990	2501	2157	2160	1965
Normalized	19.67%	78.58%	91.12%	90.99%	100%
Standard Deviation	2%	2%	1.6%	0.1%	0.2%
TensorFlow Lite - Mobilenet Quant (us)	5725	1980	1503	3848	3967
Normalized	26.25%	75.9%	100%	39.06%	37.88%
Standard Deviation	0.6%	1.3%	2%	5.4%	7%
TensorFlow Lite - I.R.V (us)	171169	45956	40051	41367	41180
Normalized	23.4%	87.15%	100%	96.82%	97.26%
Standard Deviation	0.8%	1.3%	1.3%	0.1%	0.5%
ASTC Encoder - Thorough (sec)	33.5198	16.5222	13.9248	7.9818	7.2625
Normalized	21.67%	43.96%	52.16%	90.99%	100%
Standard Deviation	0%	0.1%	0%	0.3%	0%
ASTC Encoder - Exhaustive	277.7669	159.2039	139.3797	72.3908	69.6387
Normalized	25.07%	43.74%	49.96%	96.2%	100%
Standard Deviation	0%	0%	0%	0.1%	0.1%
Stress-NG - Crypto (Bogo Ops/s)	11985	17924	23182	13556	10210
Normalized	51.7%	77.32%	100%	58.48%	44.04%
Standard Deviation	0.1%	0.9%	0.2%	0.1%	0.1%
Stress-NG - IO_uring (Bogo	918172	770522	843016	768723	1037943
Normalized	88.46%	74.24%	81.22%	74.06%	100%
Standard Deviation	0.7%	0.5%	0.1%	0.2%	0.1%

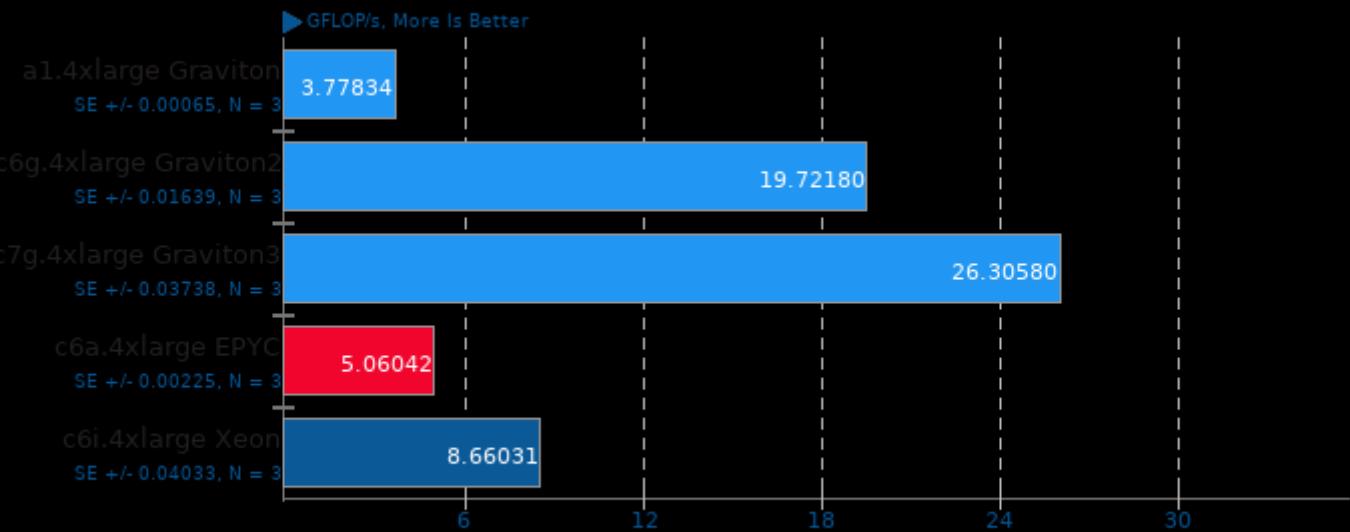
Amazon EC2 Graviton3 Benchmark Comparison

Stress-NG - CPU Stress (Bogo Ops/s)	2366	3405	5030	13305	12527
Normalized	17.78%	25.59%	37.8%	100%	94.16%
Standard Deviation	0%	0%	0%	0.5%	2.2%
Stress-NG - Vector Math (Bogo Ops/s)	27341	37754	55258	53788	40140
Normalized	49.48%	68.32%	100%	97.34%	72.64%
Standard Deviation	0%	0.1%	0.1%	0%	0.1%
Stress-NG - Memory Copying (Bogo Ops/s)	798.24	2903	6693	3552	3150
Normalized	11.93%	43.37%	100%	53.06%	47.07%
Standard Deviation	0.2%	0.2%	0.1%	0.6%	0.1%
GPAW - Carbon Nanotube (sec)	769.346	215.528	155.180	302.956	202.106
Normalized	20.17%	72%	100%	51.22%	76.78%
Standard Deviation	1.2%	0.1%	0.1%	0.1%	0.2%
PyBench - T.F.A.T.T	3452	1741	1185	1961	997
Normalized	28.88%	57.27%	84.14%	50.84%	100%
Standard Deviation	0.9%	0.2%	0%	0.1%	0.7%
nginx - 100 (Req/sec)	143155	307349	345711	356303	
Normalized	36.89%	79.21%	89.1%	100%	91.83%
Standard Deviation	0%	2.2%	1%	0.2%	0.8%
nginx - 200 (Req/sec)	141436	308939	352381	390933	356830
Normalized	36.18%	79.03%	90.14%	100%	91.28%
Standard Deviation	0.2%	0.8%	2%	0.6%	0.8%
nginx - 500 (Req/sec)	139415	310597	346613	389030	351673
Normalized	35.84%	79.84%	89.1%	100%	90.4%
Standard Deviation	0.2%	2.1%	0.5%	0.3%	0.8%
nginx - 1000 (Req/sec)	138205	308213	346815	388658	347345
Normalized	35.56%	79.3%	89.23%	100%	89.37%
Standard Deviation	0.1%	0.9%	0.7%	0.3%	1.3%
ONNX Runtime - GPT-2 - CPU - Standard (Inferences/min)	2312	6948	7990	5617	7944
Normalized	28.94%	86.96%	100%	70.3%	99.42%
Standard Deviation	0.2%	0.1%	0.1%	4.6%	14.1%
ONNX Runtime - bertsquad-12 - CPU - Standard (Inferences/min)	115	322	407	488	773
FCN - fcn-resnet101-11 - CPU - Standard (Inferences/min)	10	28	38	65	139
Normalized	14.88%	41.66%	52.65%	63.13%	100%
Standard Deviation	1.3%	0.1%	0.1%	0.2%	22.8%
ONNX Runtime - ArcFace - CPU - Standard (Inferences/min)	165	334	609	1192	1374
Normalized	12.01%	24.31%	44.32%	86.75%	100%
Standard Deviation	0.5%	0.1%	0%	24%	23.1%
ONNX Runtime - ResNet-100 - CPU - Standard (Inferences/min)	757	2072	2817	3696	3450
Normalized	20.48%	56.06%	76.22%	100%	93.34%
Standard Deviation	0.1%	0.1%	0.1%	22%	0.1%

Amazon EC2 Graviton3 Benchmark Comparison

Apache HTTP Server - 100	18636	46995	67232	77568	86546
(Reqs/sec)					
Normalized	21.53%	54.3%	77.68%	89.63%	100%
Standard Deviation	0.3%	0.3%	0.1%	0.5%	0.8%
Apache HTTP Server - 200	20888	50060	73677	83070	94458
(Reqs/sec)					
Normalized	22.11%	53%	78%	87.94%	100%
Standard Deviation	0.5%	0.4%	1.5%	1.3%	1.1%
Apache HTTP Server - 500	20133	50078	73546	81996	91747
(Reqs/sec)					
Normalized	21.94%	54.58%	80.16%	89.37%	100%
Standard Deviation	0.8%	2%	0.2%	2.8%	2.4%
Apache HTTP Server - 1000	19279	46629	72719	71537	79831
(Reqs/sec)					
Normalized	24.15%	58.41%	91.09%	89.61%	100%
Standard Deviation	0.9%	1%	0.2%	1%	0.7%
PHPBench - P.B.S (Score)	241259	449855	666484	480741	828186
Normalized	29.13%	54.32%	80.48%	58.05%	100%
Standard Deviation	0.6%	0.3%	0.1%	1%	0.2%

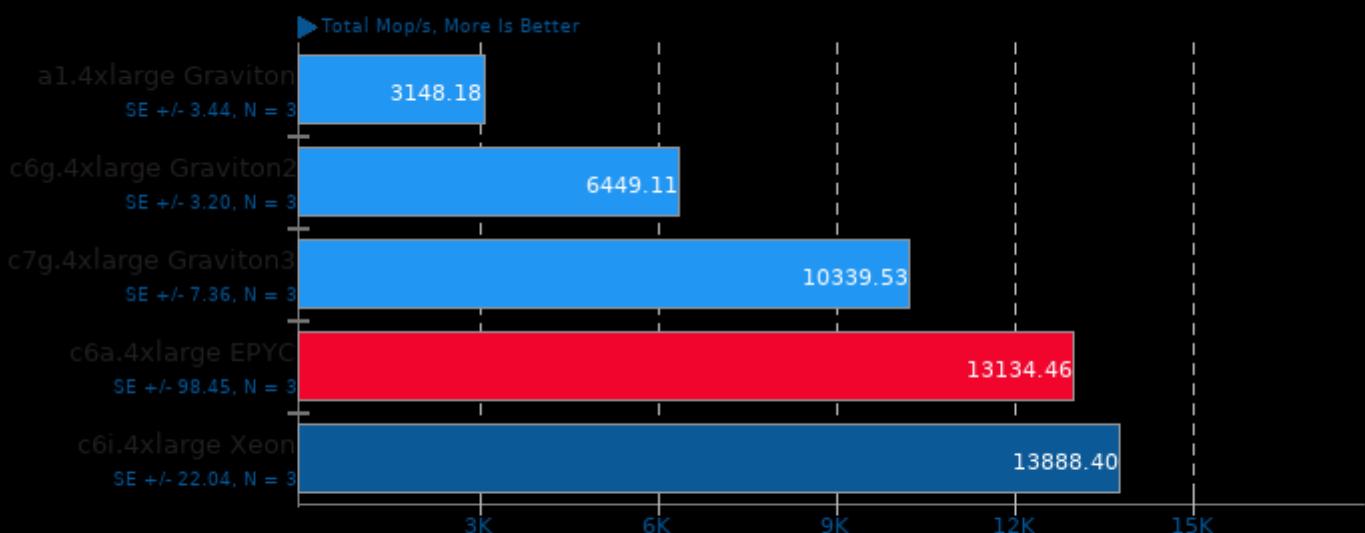
High Performance Conjugate Gradient 3.1



1. (CXX) g++ options: -O3 -ffast-math -fno-vectorize -lmpi_cxx -lmpi

NAS Parallel Benchmarks 3.4

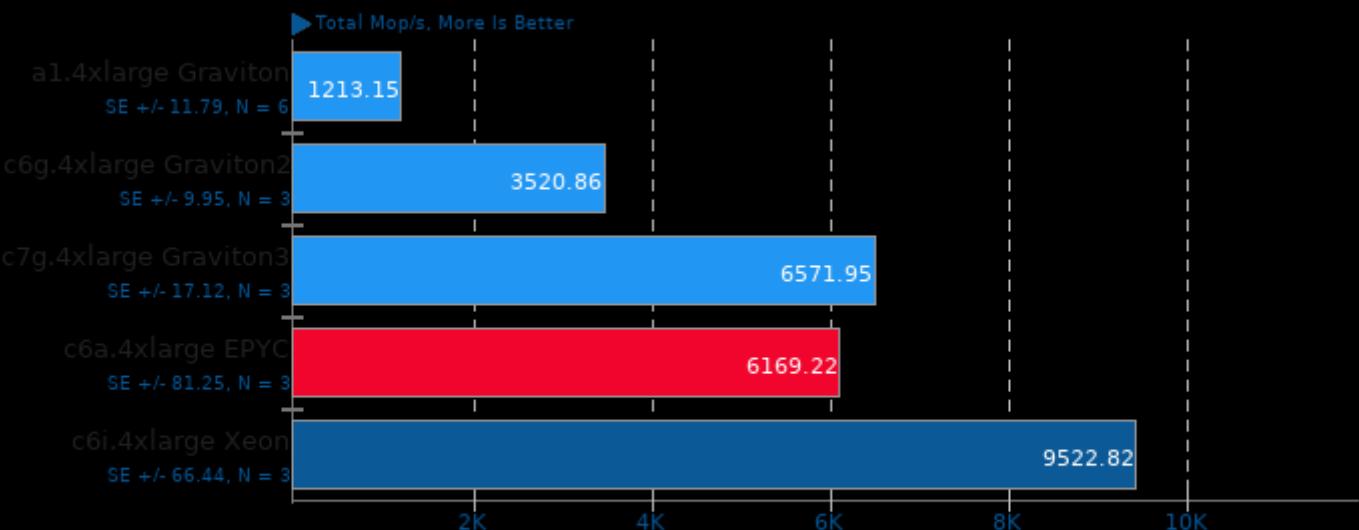
Test / Class: BT.C



1. (F9X) gfortran options: -O3 -march=native -lmpi_usempif08 -lmpi_mpifh -lmpi -lopen-rte -lopen-pal -lhwloc -levent_core -levent_pthreads -lm -lz
 2. Open MPI 4.1.2

NAS Parallel Benchmarks 3.4

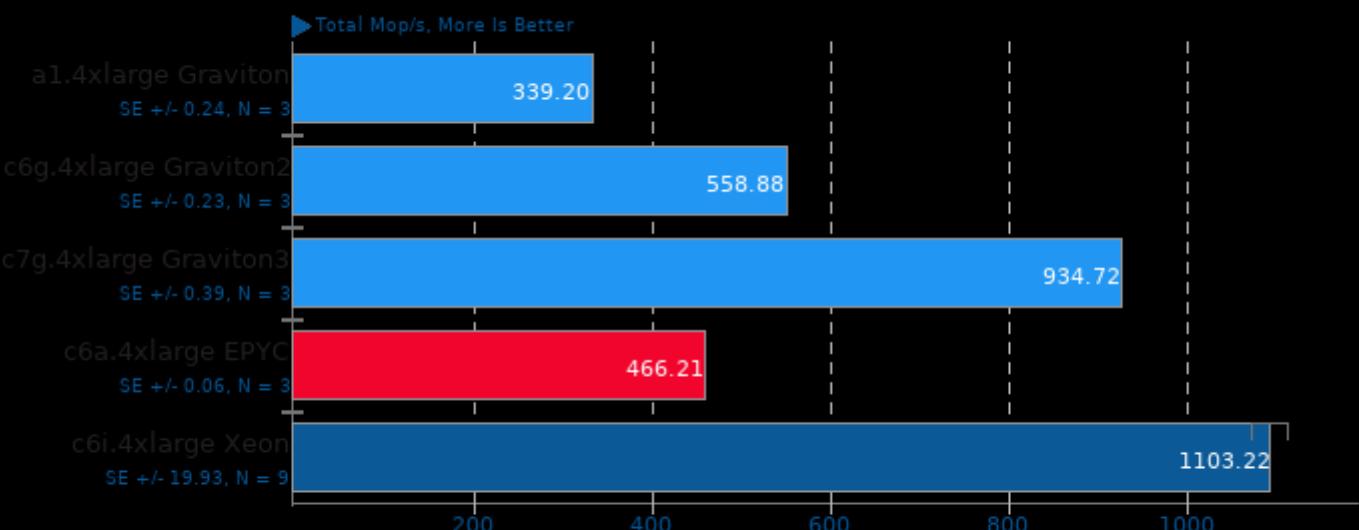
Test / Class: CG.C



1. (F9X) gfortran options: -O3 -march=native -Impi_usempif08 -Impi_mpifh -Impi -lopen rte -lopen pal -Ihwloc -levent core -levent pthreads -lm -lz
 2. Open MPI 4.1.2

NAS Parallel Benchmarks 3.4

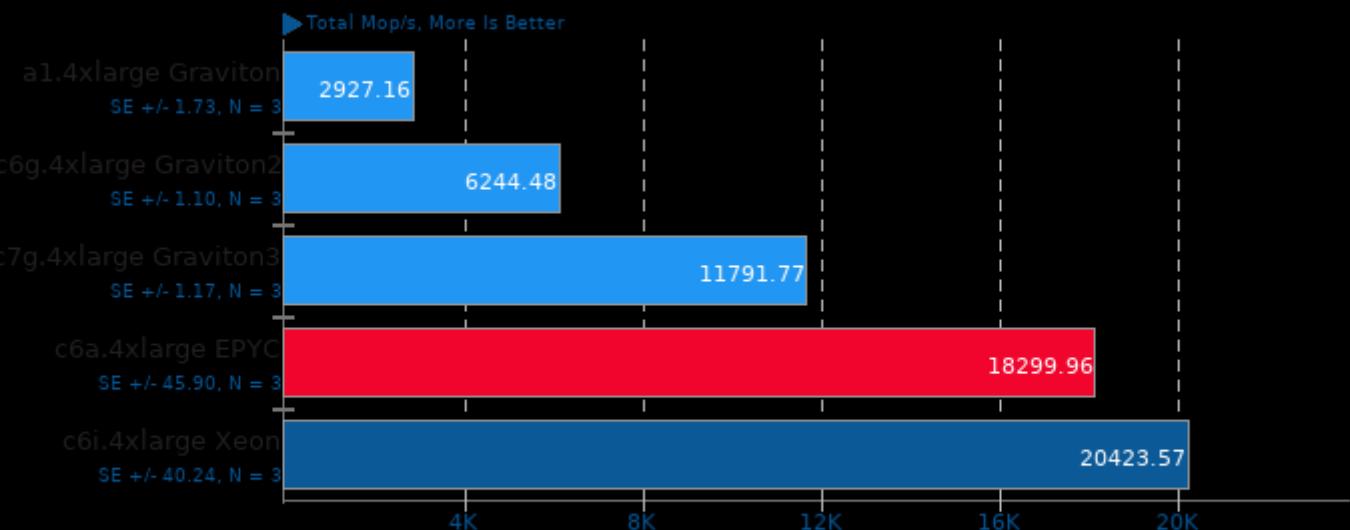
Test / Class: EP.D



1. (F9X) gfortran options: -O3 -march=native -Impi_usempif08 -Impi_mpifh -Impi -lopen rte -lopen pal -Ihwloc -levent core -levent pthreads -lm -lz
 2. Open MPI 4.1.2

NAS Parallel Benchmarks 3.4

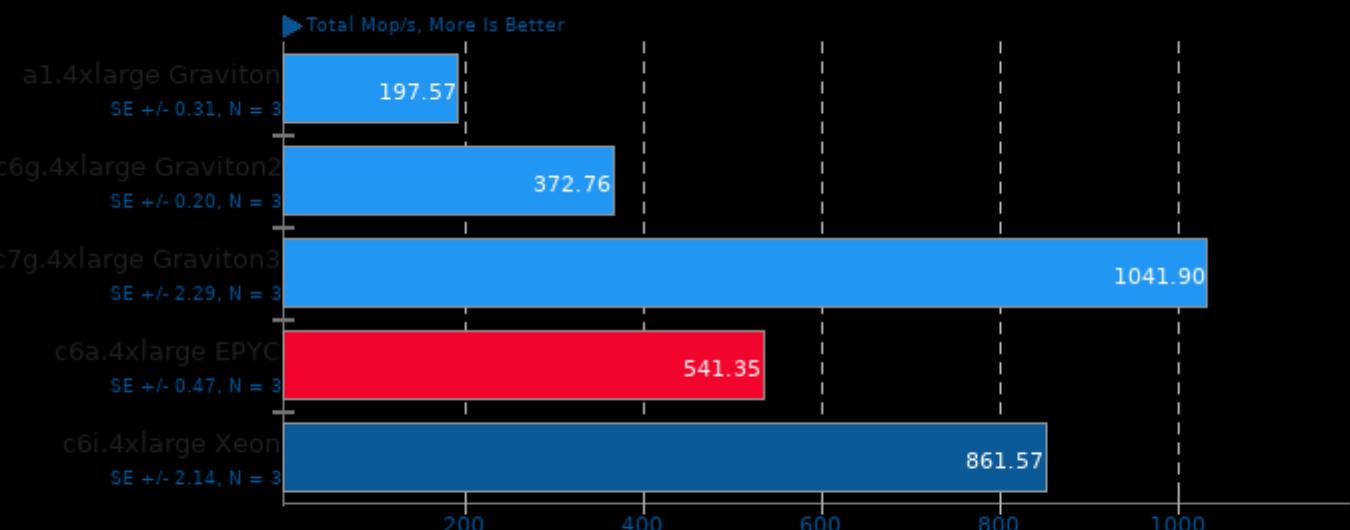
Test / Class: FT.C



1. (F9X) gfortran options: -O3 -march=native -Impi_usempif08 -Impi_mpifh -Impi -lopen-rte -lopen-pal -Ihwloc -levent_core -levent_pthreads -lm -lz
 2. Open MPI 4.1.2

NAS Parallel Benchmarks 3.4

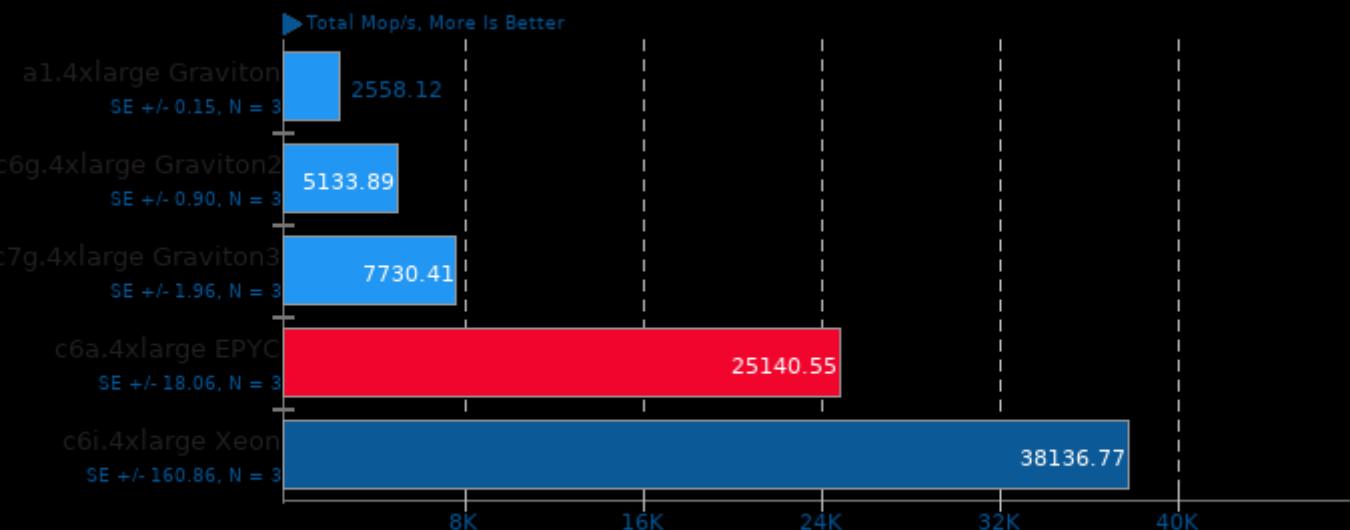
Test / Class: IS.D



1. (F9X) gfortran options: -O3 -march=native -Impi_usempif08 -Impi_mpifh -Impi -lopen-rte -lopen-pal -Ihwloc -levent_core -levent_pthreads -lm -lz
 2. Open MPI 4.1.2

NAS Parallel Benchmarks 3.4

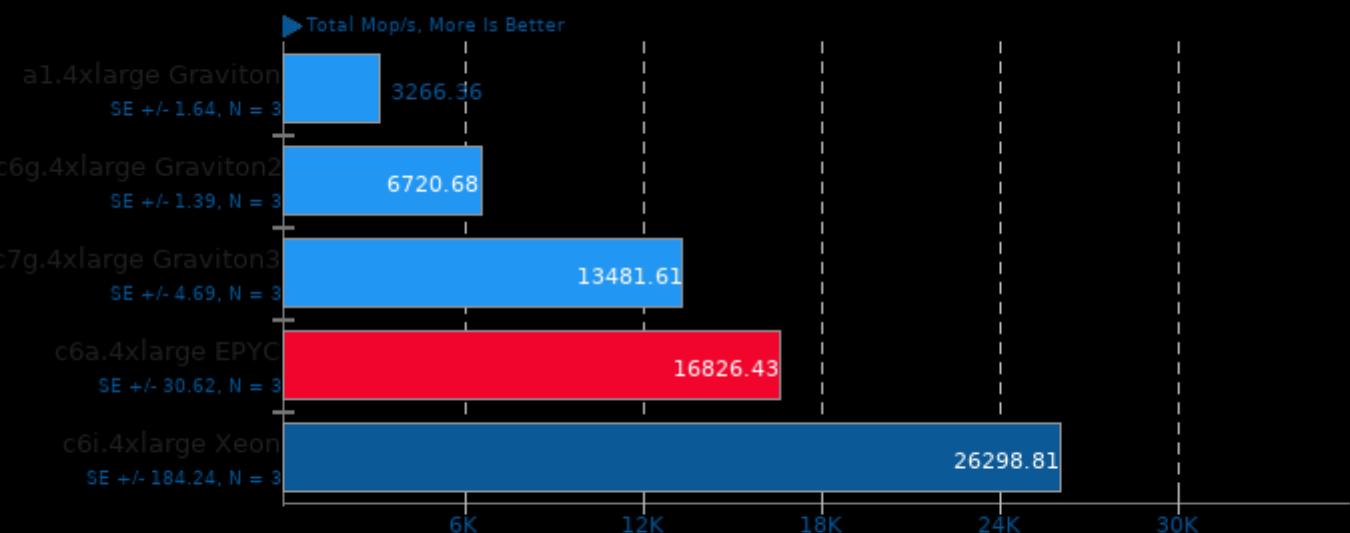
Test / Class: LU.C



1. (F9X) gfortran options: -O3 -march=native -Impi_usempif08 -Impi_mpifh -Impi -lopen rte -lopen pal -Ihwloc -levent_core -levent_pthreads -lm -lz
 2. Open MPI 4.1.2

NAS Parallel Benchmarks 3.4

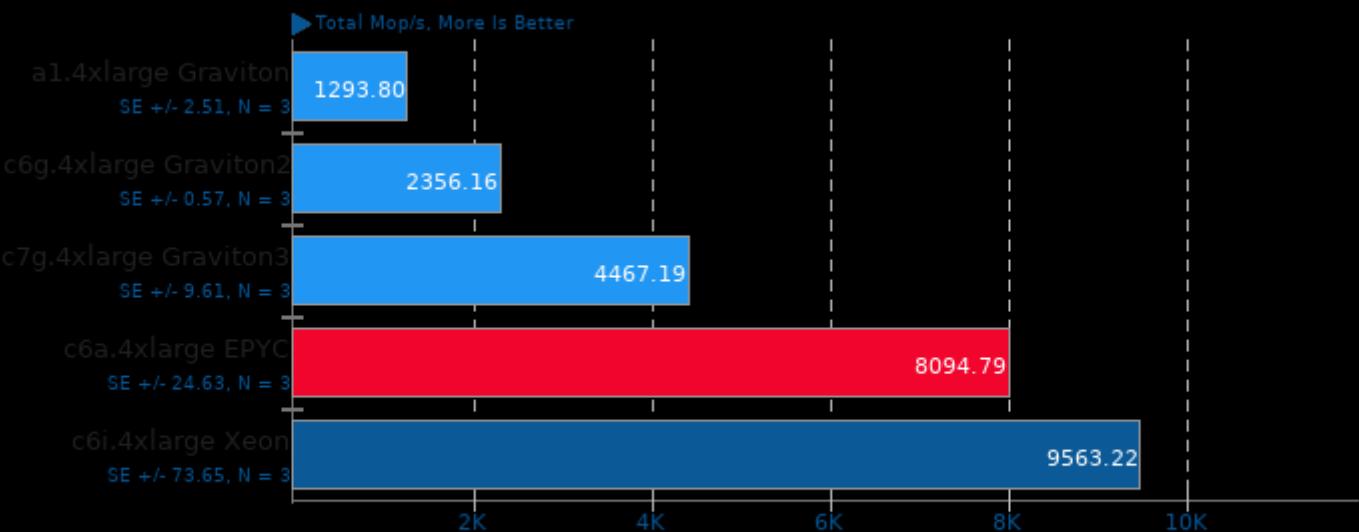
Test / Class: MG.C



1. (F9X) gfortran options: -O3 -march=native -Impi_usempif08 -Impi_mpifh -Impi -lopen rte -lopen pal -Ihwloc -levent_core -levent_pthreads -lm -lz
 2. Open MPI 4.1.2

NAS Parallel Benchmarks 3.4

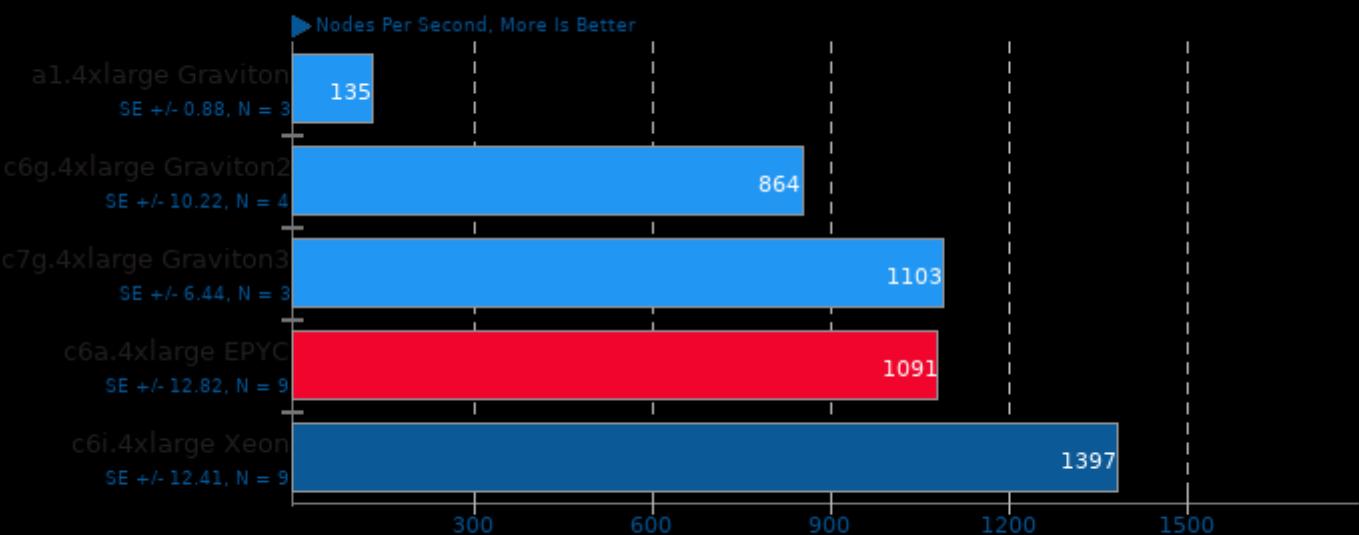
Test / Class: SPC



1. (F9X) gfortran options: -O3 -march=native -Impi_usempif08 -Impi_mpifh -Impi -lopen-rte -lopen-pal -Ihwloc -levent_core -levent_pthreads -lm -lz
2. Open MPI 4.1.2

LeelaChessZero 0.28

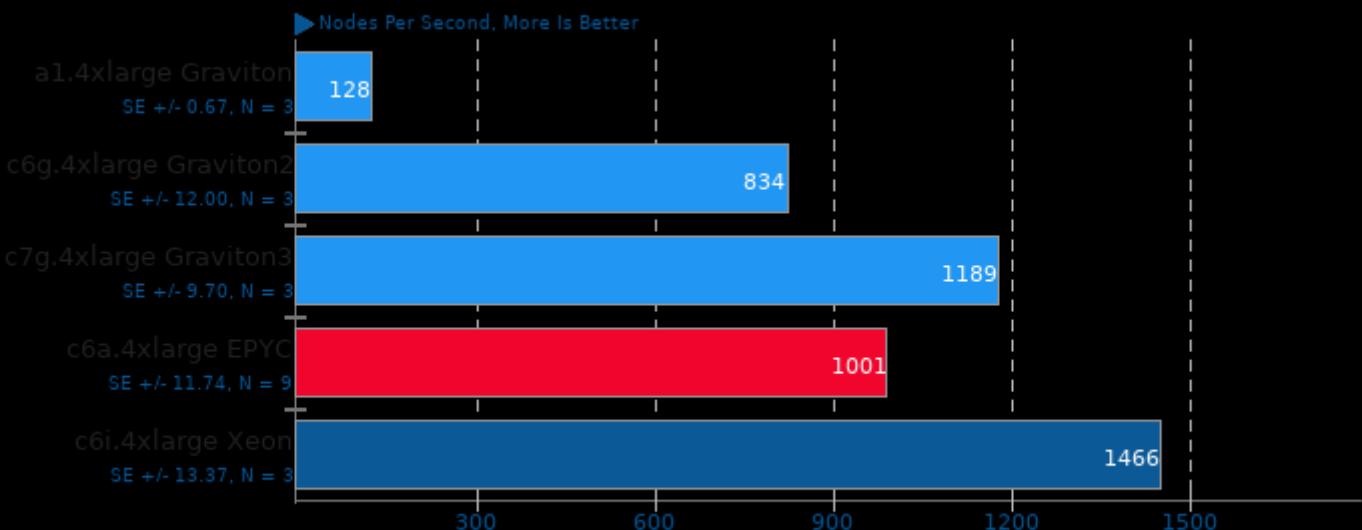
Backend: BLAS



1. (CXX) g++ options: -fno -pthread

LeelaChessZero 0.28

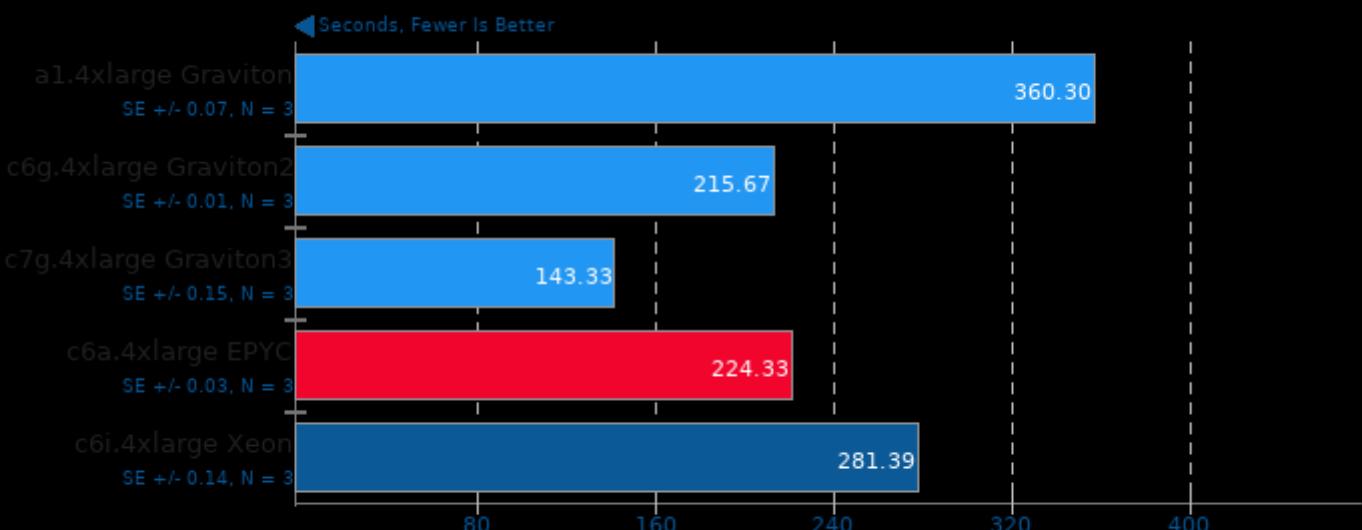
Backend: Eigen



1. (CXX) g++ options: -fno -pthread

Rodinia 3.1

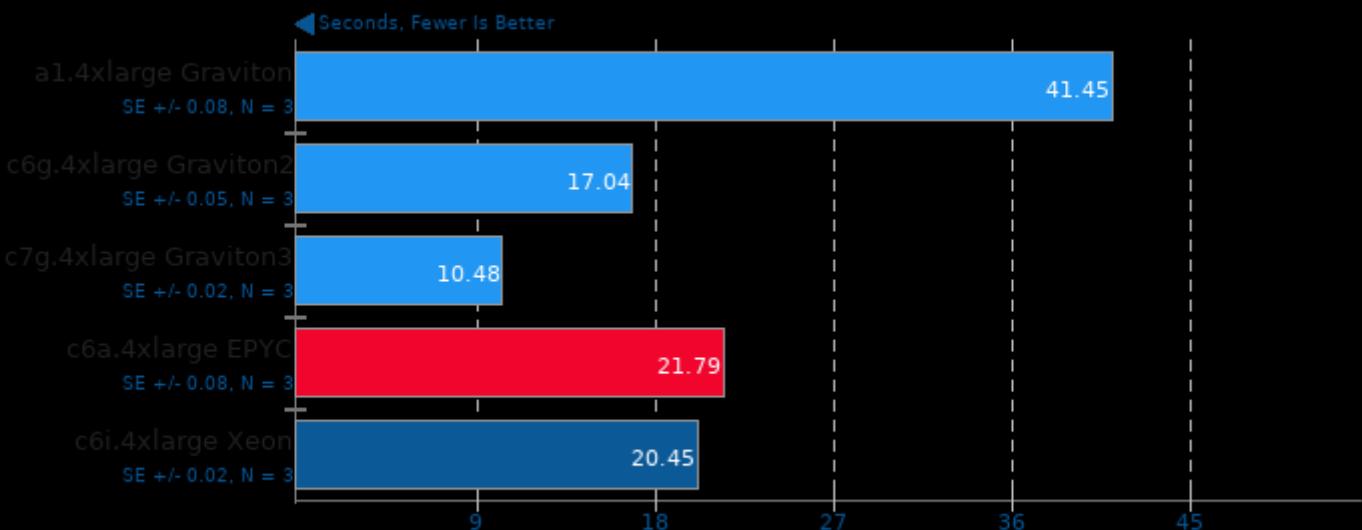
Test: OpenMP LavaMD



1. (CXX) g++ options: -O2 -fOpenCL

Rodinia 3.1

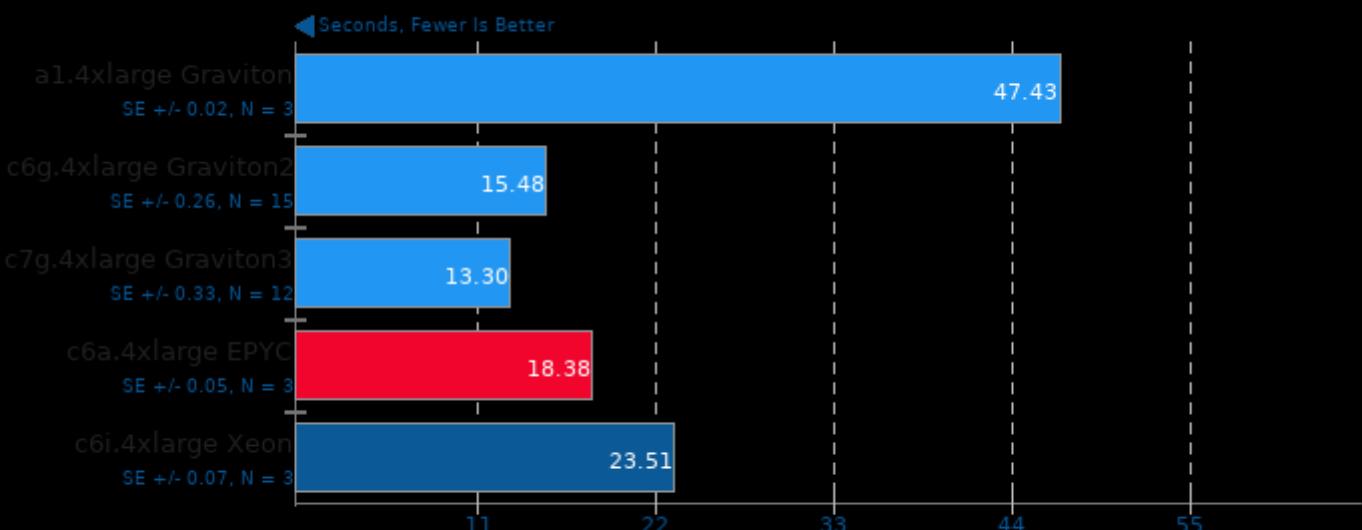
Test: OpenMP CFD Solver



1. (CXX) g++ options: -O2 -fOpenCL

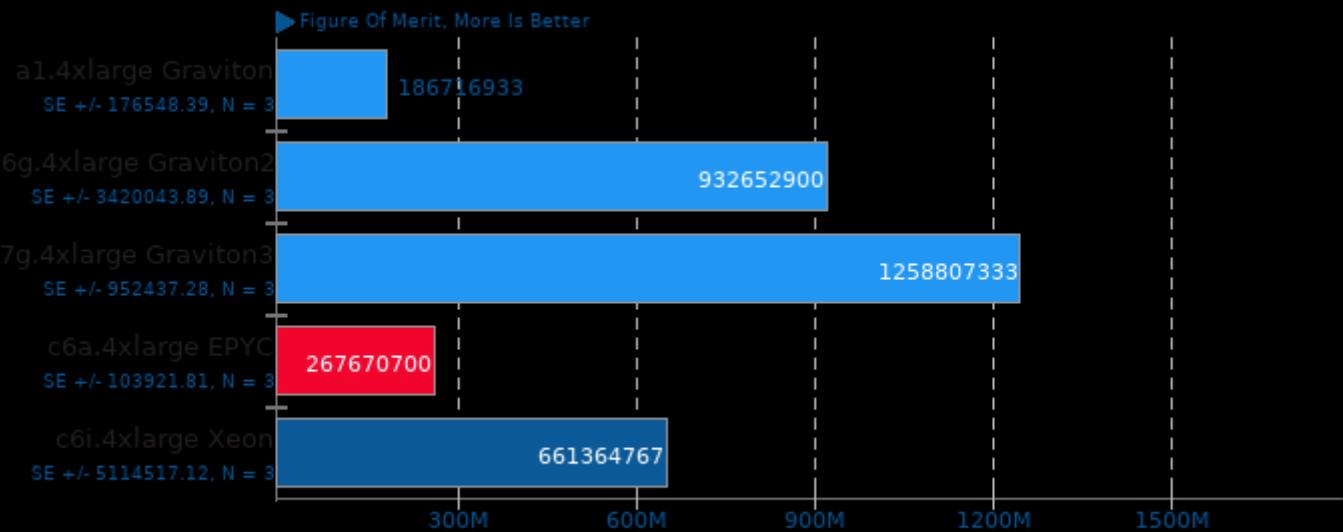
Rodinia 3.1

Test: OpenMP Streamcluster



1. (CXX) g++ options: -O2 -fOpenCL

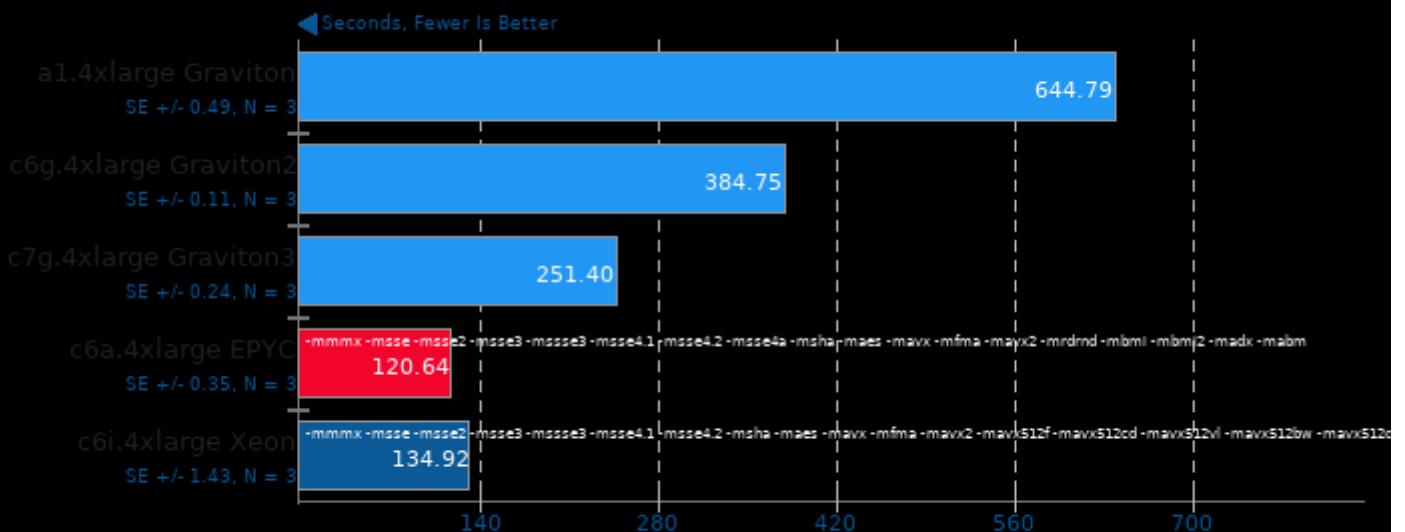
Algebraic Multi-Grid Benchmark 1.2



1. (CC) gcc options: -fparcsr_ls -fparcsr_mv -fseq_mv -fij_mv -fkrylov -fHYPRE_utilities -fmem -fopenmp -fmpi

Timed MrBayes Analysis 3.2.7

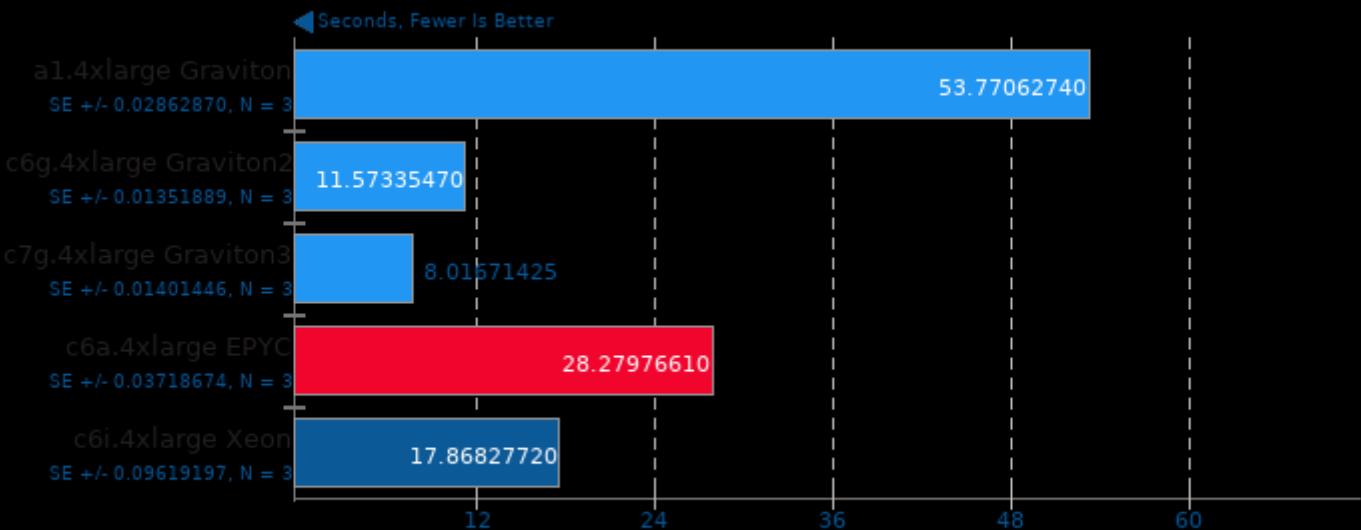
Primate Phylogeny Analysis



1. (CC) gcc options: -O3 -std=c99 -pedantic -fmem

Xcompact3d Incompact3d 2021-03-11

Input: input.i3d 129 Cells Per Direction



1. (F9X) gfortran options: -cpp -O2 -funroll-loops -floop-optimize -fcray-pointer -fbacktrace -lmpi_usempif08 -lmpi_mpifh -lmpi -lopen rte -lopen pal -lhwloc

Xcompact3d Incompact3d 2021-03-11

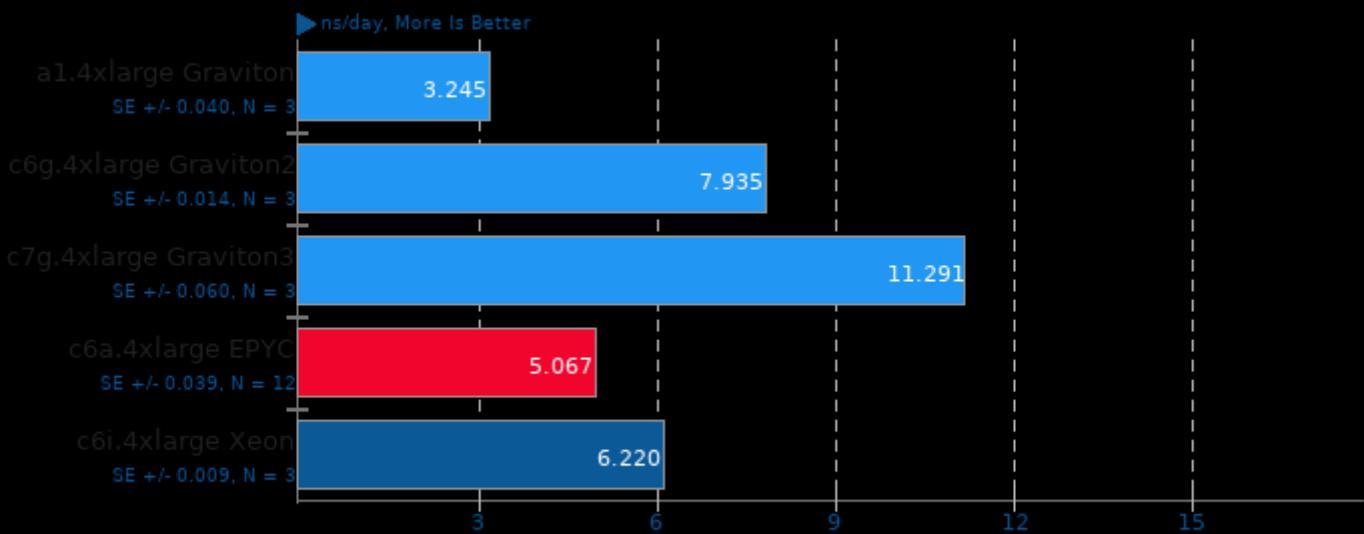
Input: input.i3d 193 Cells Per Direction



1. (F9X) gfortran options: -cpp -O2 -funroll-loops -floop-optimize -fcray-pointer -fbacktrace -lmpi_usempif08 -lmpi_mpifh -lmpi -lopen rte -lopen pal -lhwloc

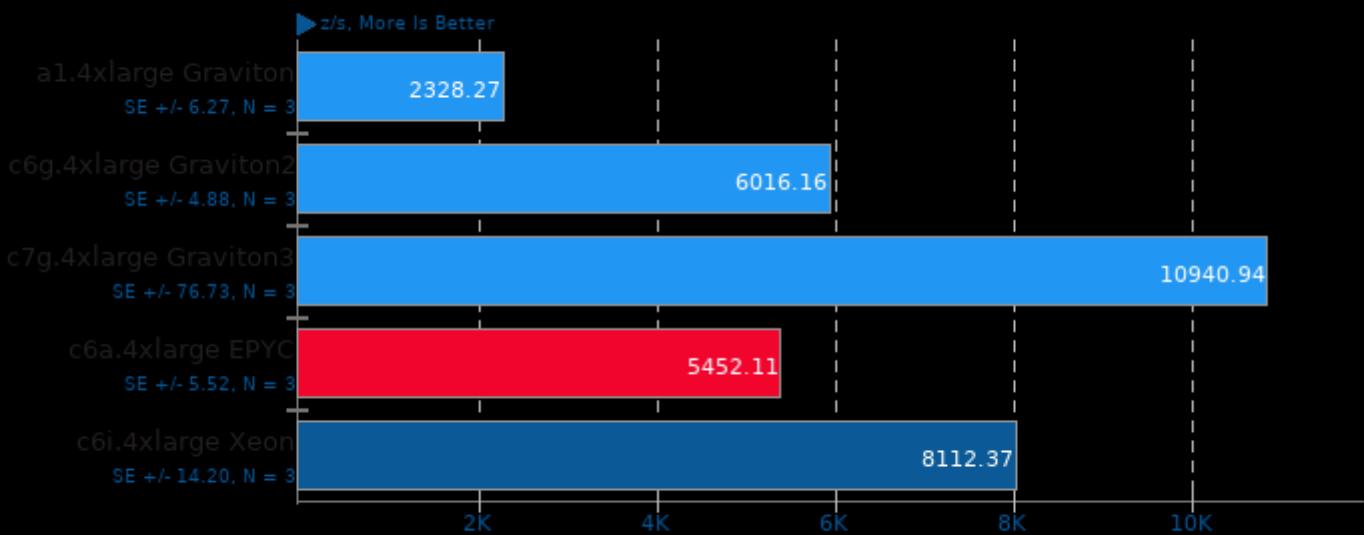
LAMMPS Molecular Dynamics Simulator 29Oct2020

Model: Rhodopsin Protein



1. (CXX) g++ options: -O3 -lm

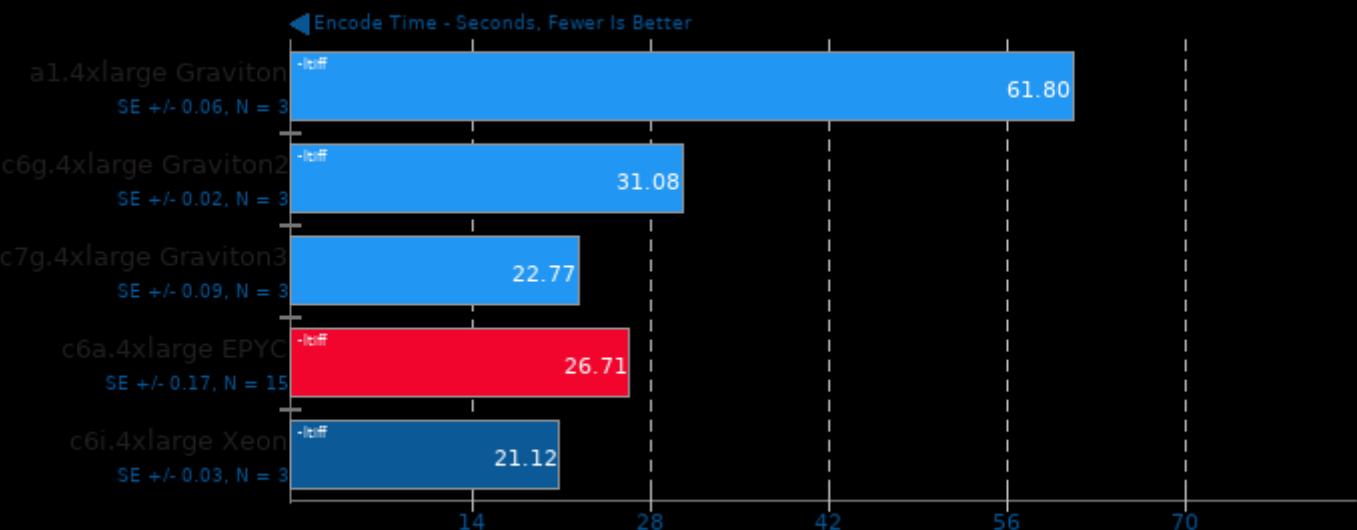
LULESH 2.0.3



1. (CXX) g++ options: -O3 -fopenmp -lm -lmpi_cxx -lmpi

WebP Image Encode 1.1

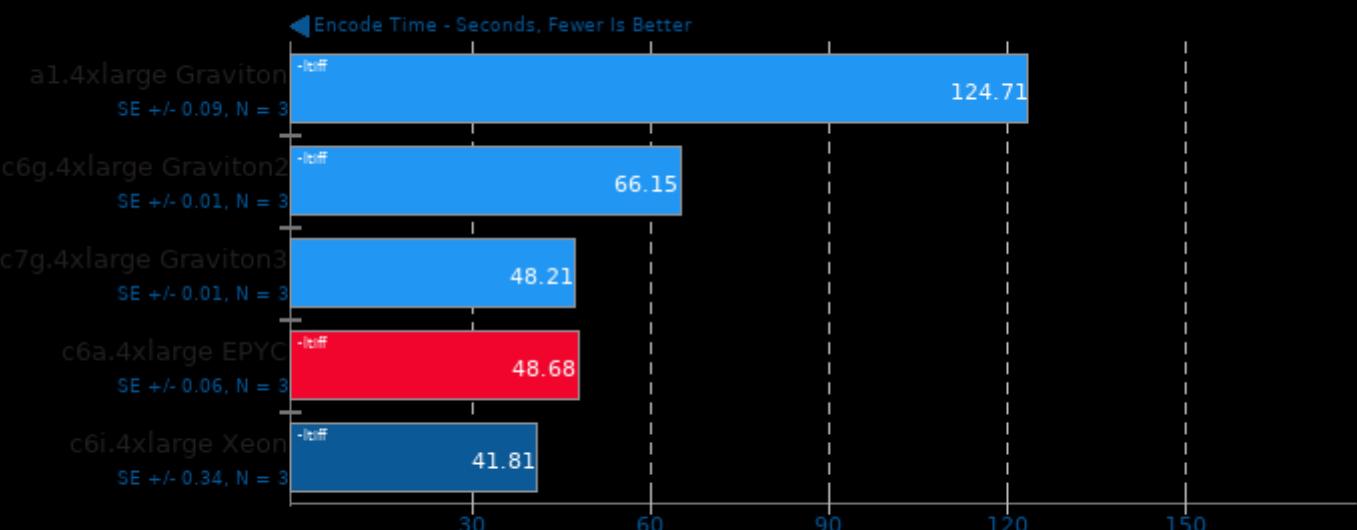
Encode Settings: Quality 100, Lossless



1. (CC) gcc options: -fvisibility=hidden -O2 -lm -ljpeg -lpng16

WebP Image Encode 1.1

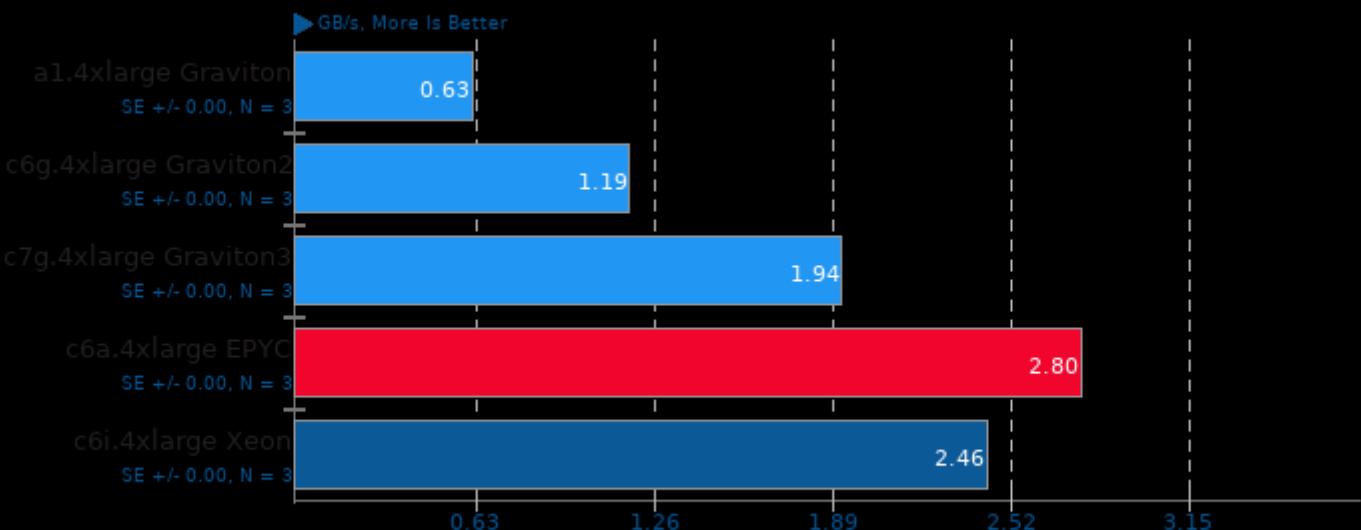
Encode Settings: Quality 100, Lossless, Highest Compression



1. (CC) gcc options: -fvisibility=hidden -O2 -lm -ljpeg -lpng16

simdjson 1.0

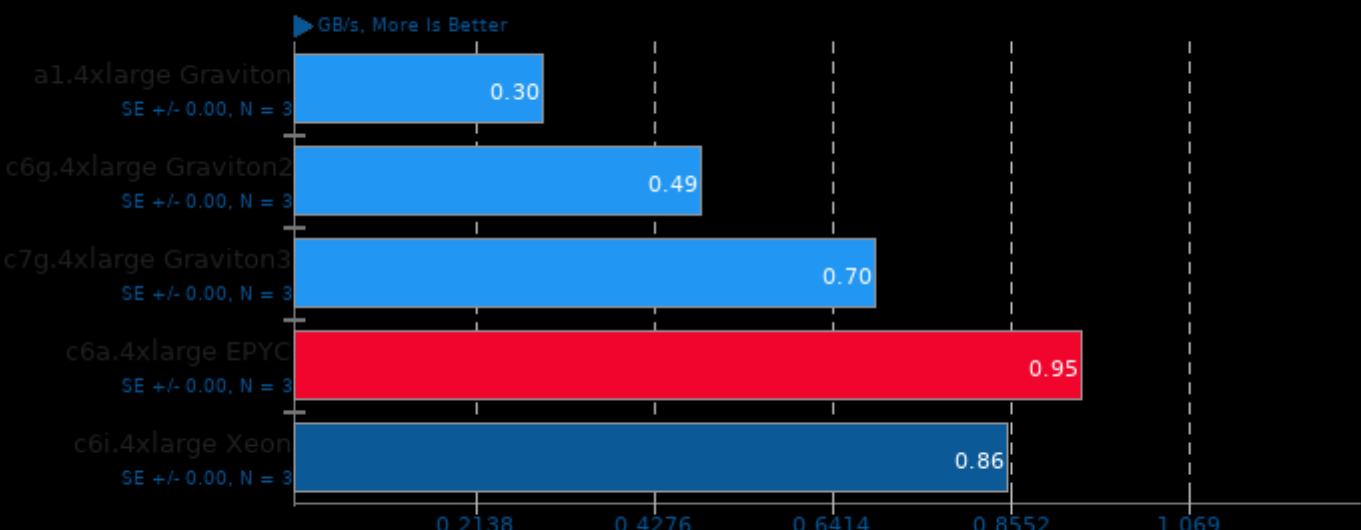
Throughput Test: Kostya



1. (CXX) g++ options: -O3

simdjson 1.0

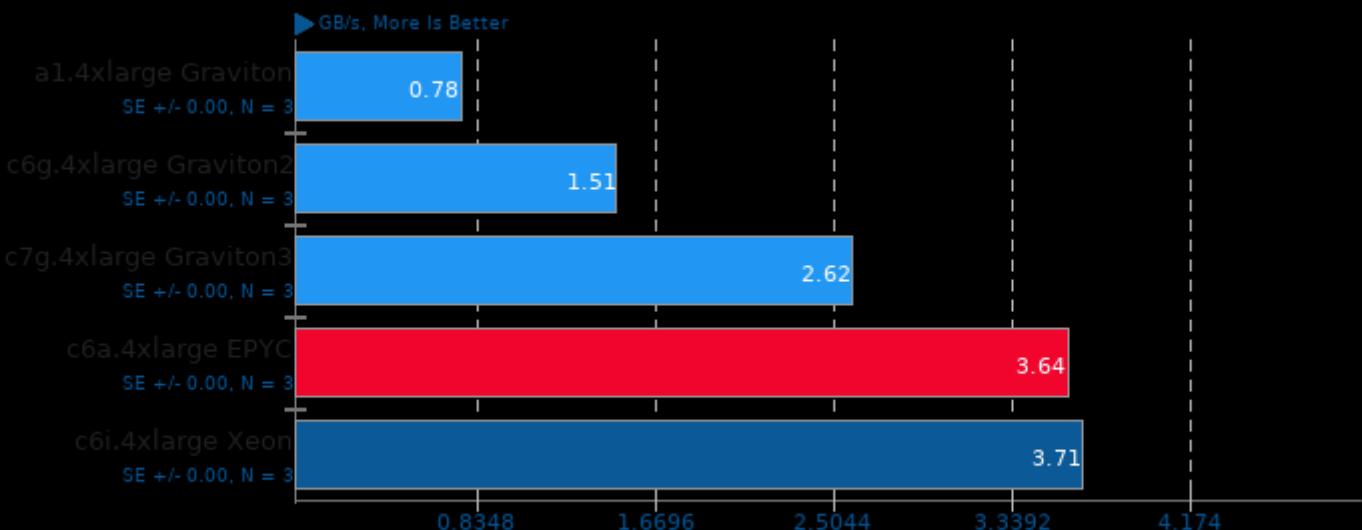
Throughput Test: LargeRandom



1. (CXX) g++ options: -O3

simdjson 1.0

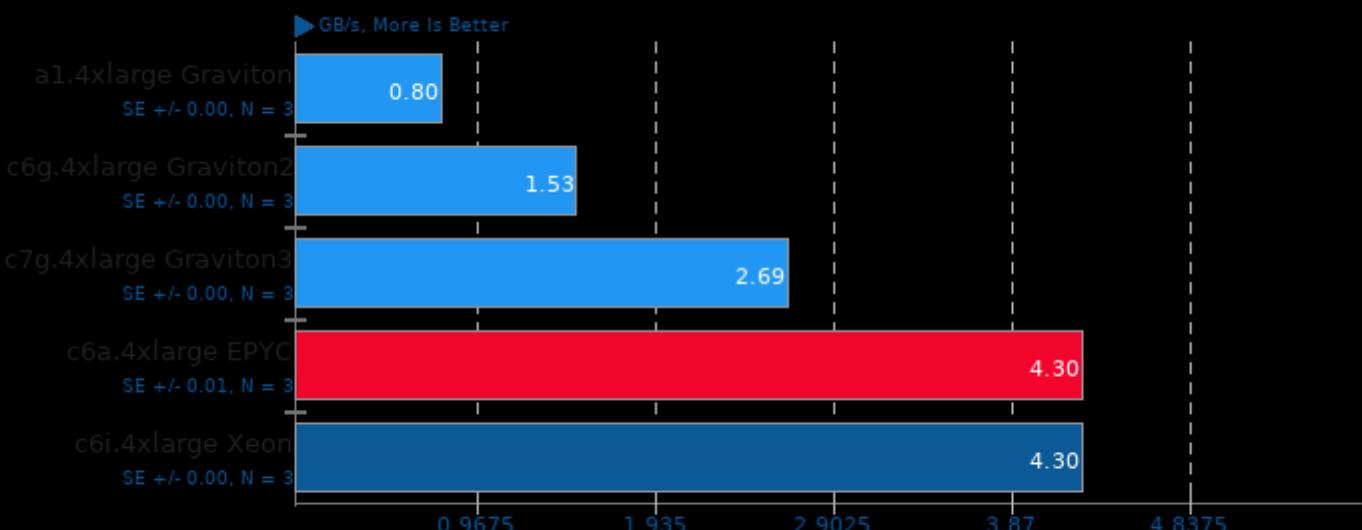
Throughput Test: PartialTweets



1. (CXX) g++ options: -O3

simdjson 1.0

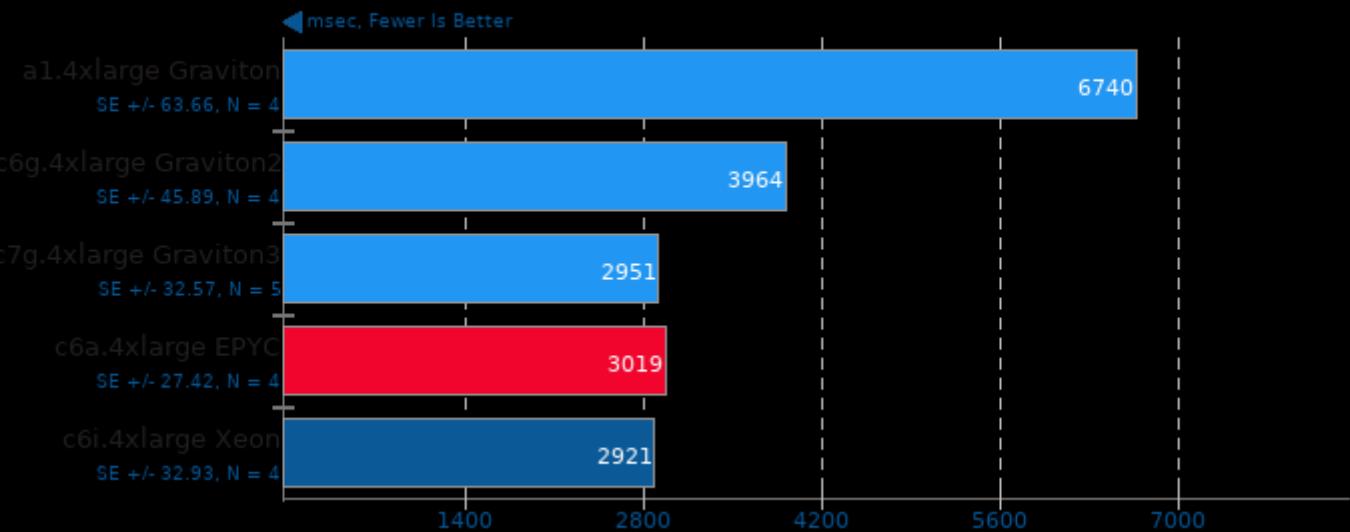
Throughput Test: DistinctUserID



1. (CXX) g++ options: -O3

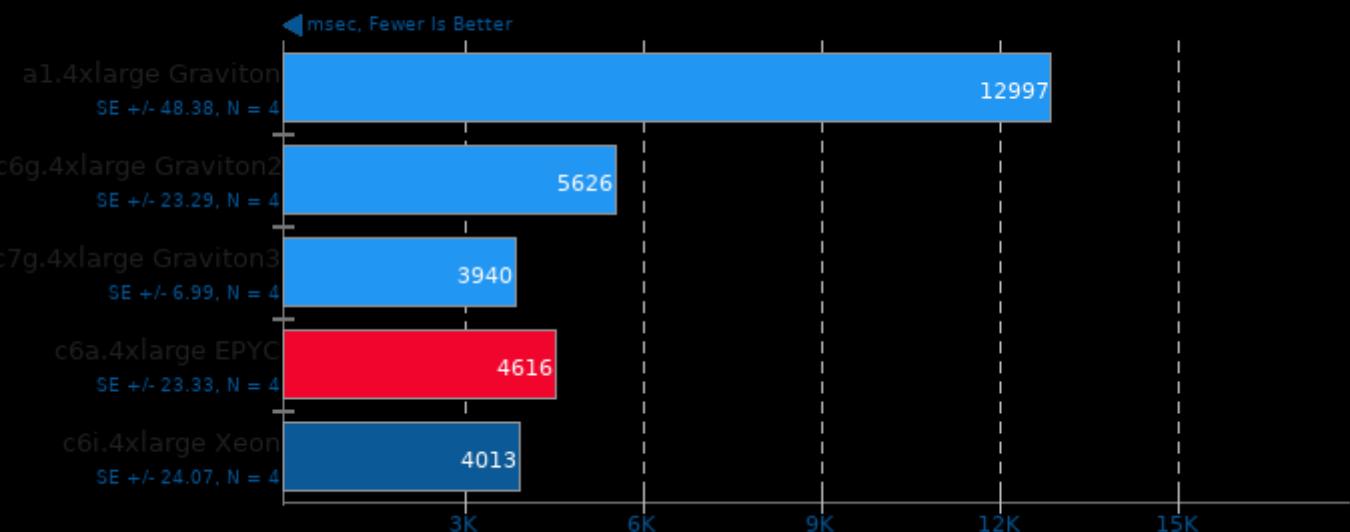
DaCapo Benchmark 9.12-MR1

Java Test: H2



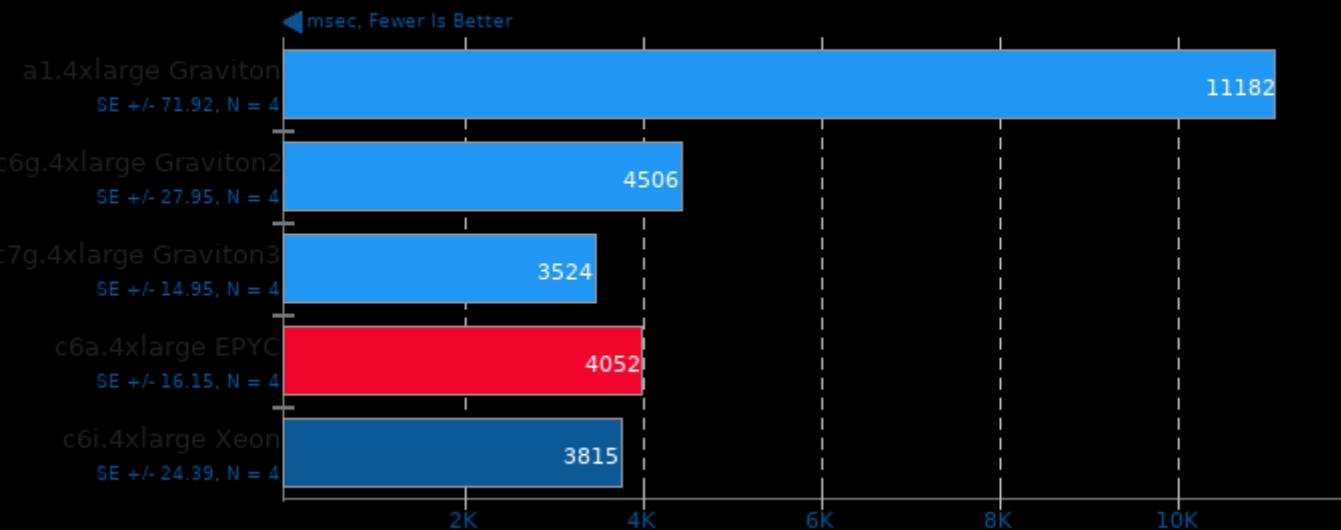
DaCapo Benchmark 9.12-MR1

Java Test: Jython



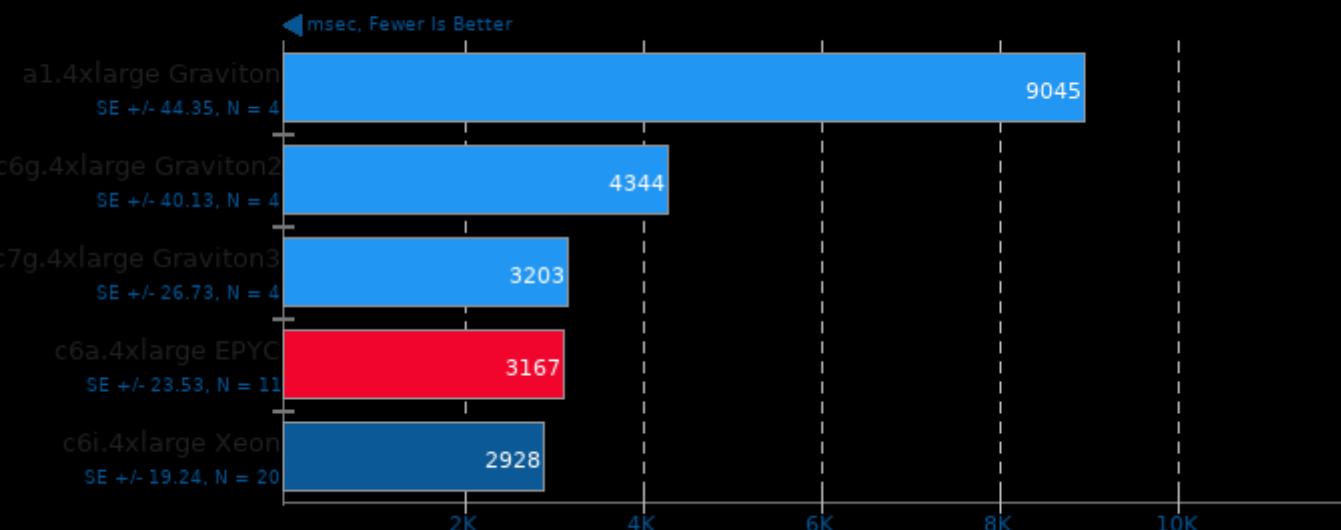
DaCapo Benchmark 9.12-MR1

Java Test: Tradesoap



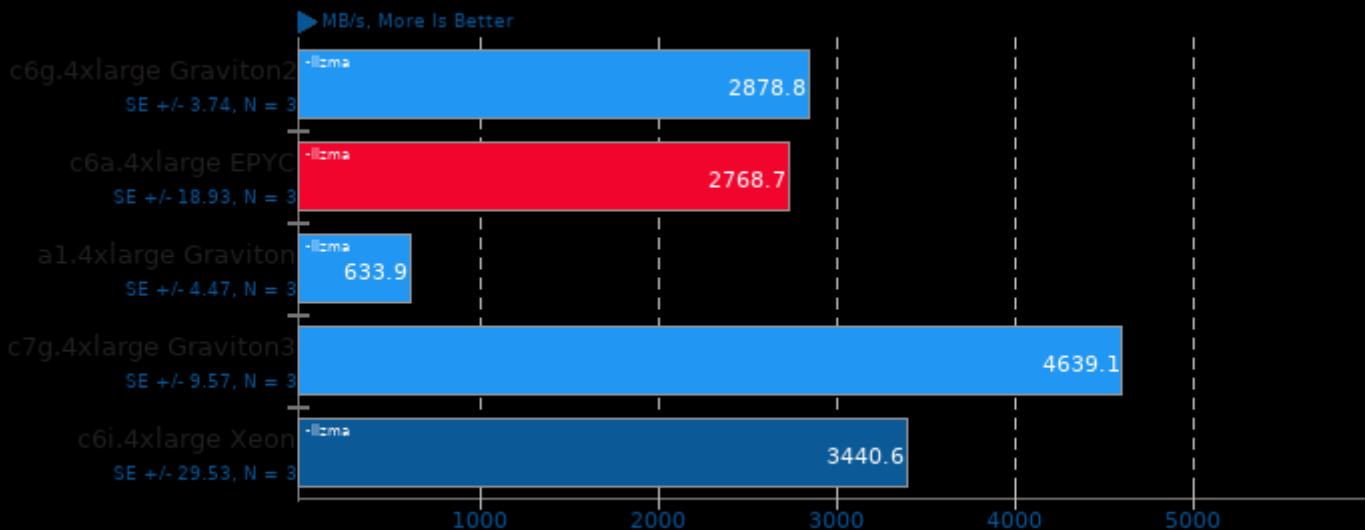
DaCapo Benchmark 9.12-MR1

Java Test: Tradebeans



Zstd Compression 1.5.0

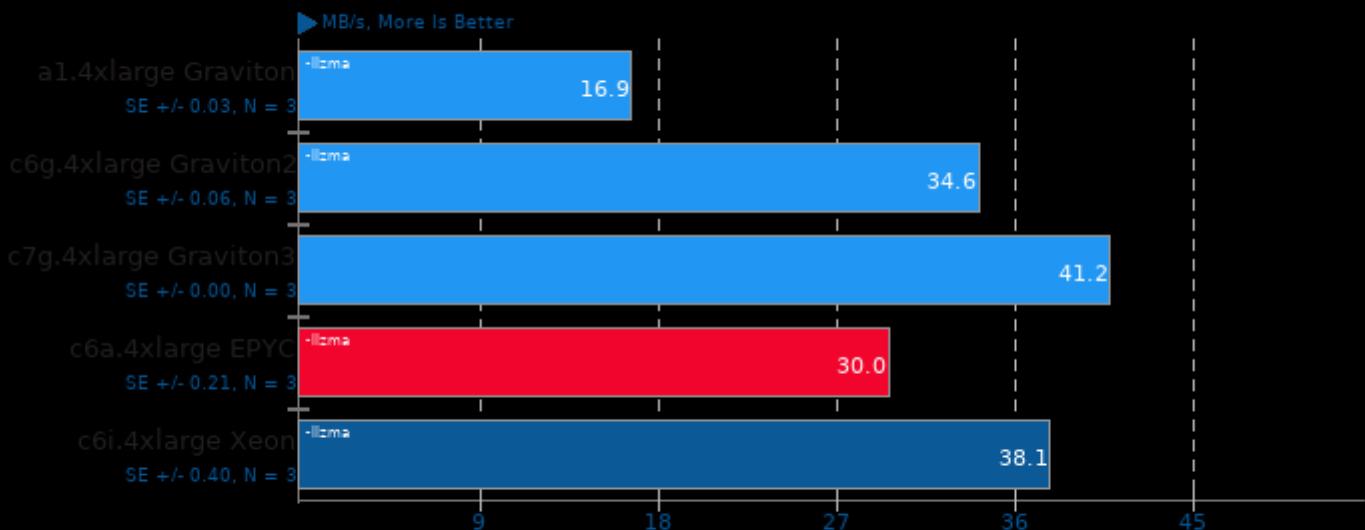
Compression Level: 3 - Compression Speed



1. (CC) gcc options: -O3 -pthread -lz

Zstd Compression 1.5.0

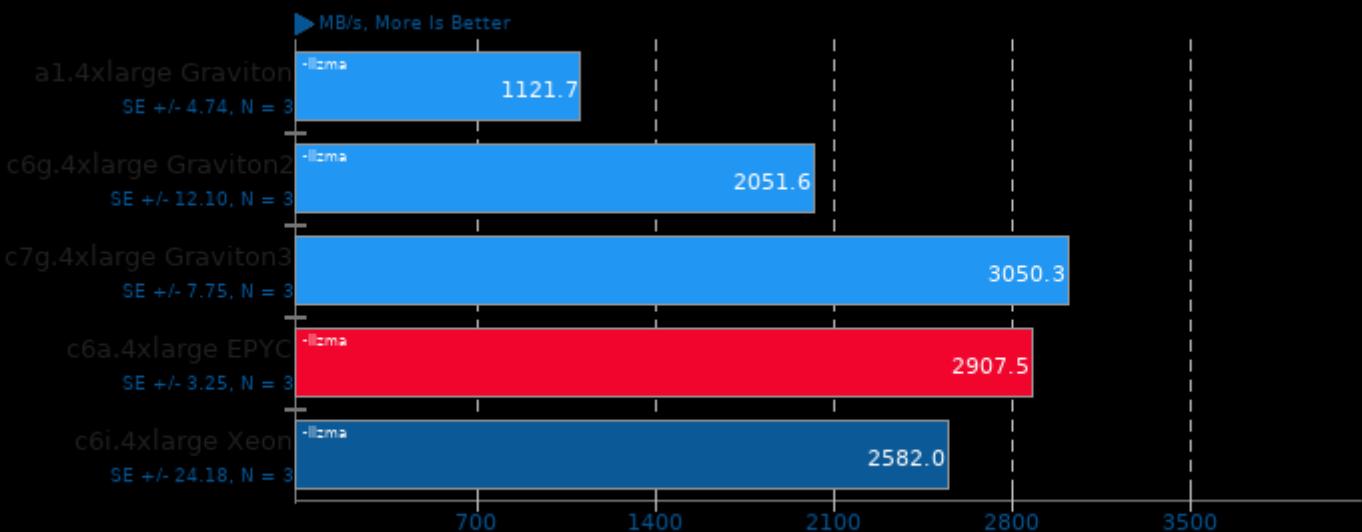
Compression Level: 19 - Compression Speed



1. (CC) gcc options: -O3 -pthread -lz

Zstd Compression 1.5.0

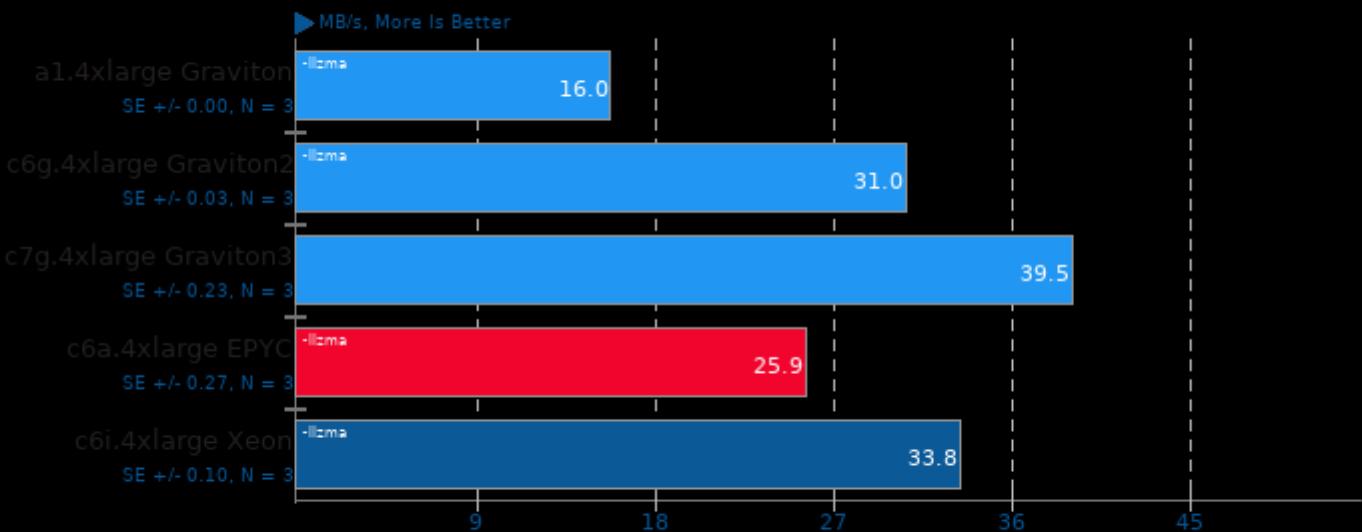
Compression Level: 19 - Decompression Speed



1. (CC) gcc options: -O3 -pthread -lz

Zstd Compression 1.5.0

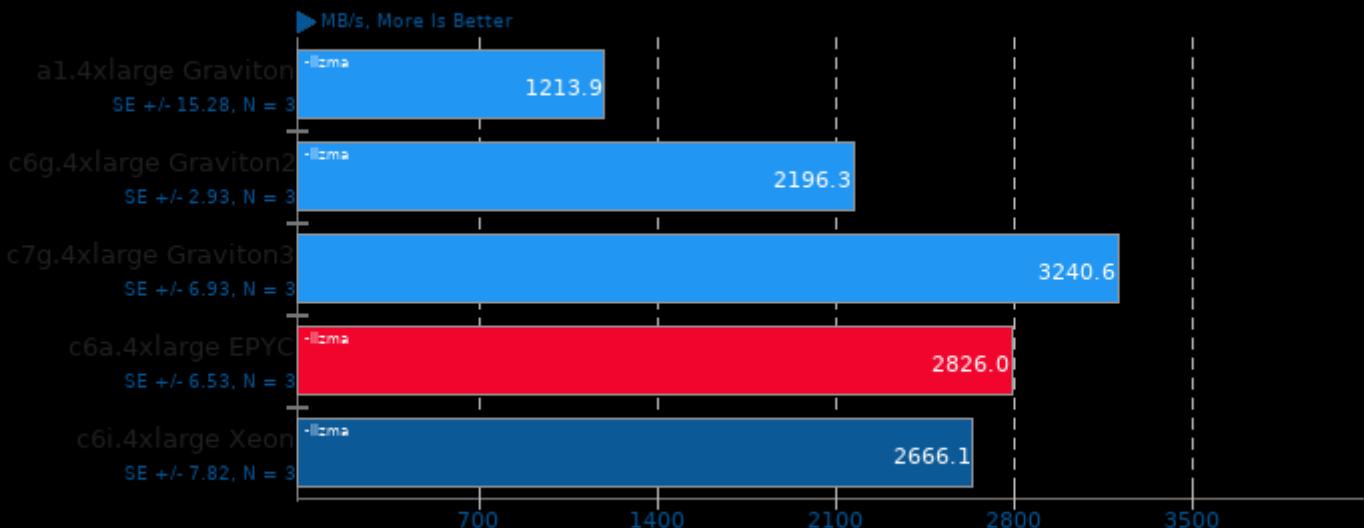
Compression Level: 19, Long Mode - Compression Speed



1. (CC) gcc options: -O3 -pthread -lz

Zstd Compression 1.5.0

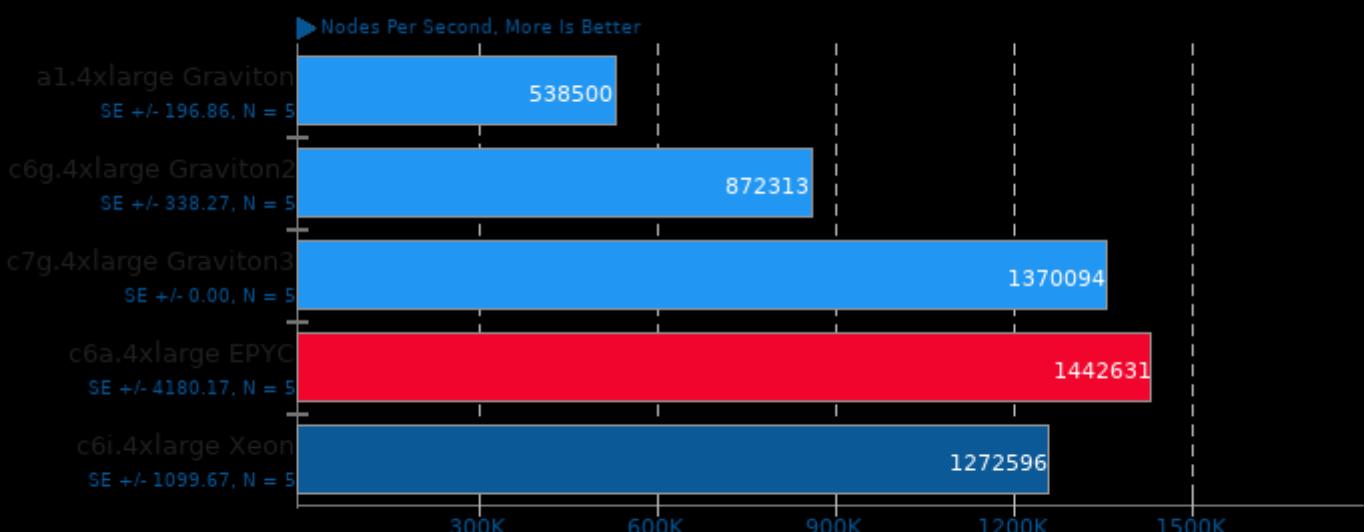
Compression Level: 19, Long Mode - Decompression Speed



1. (CC) gcc options: -O3 -pthread -lz

TSCP 1.81

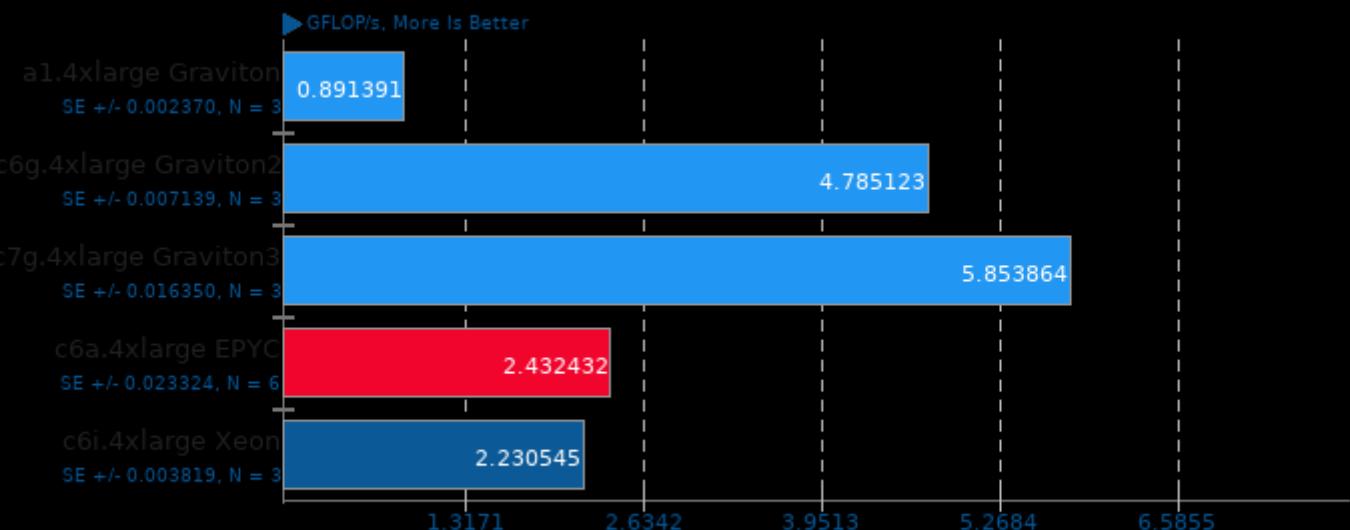
AI Chess Performance



1. (CC) gcc options: -O3 -march=native

ACES DGEMM 1.0

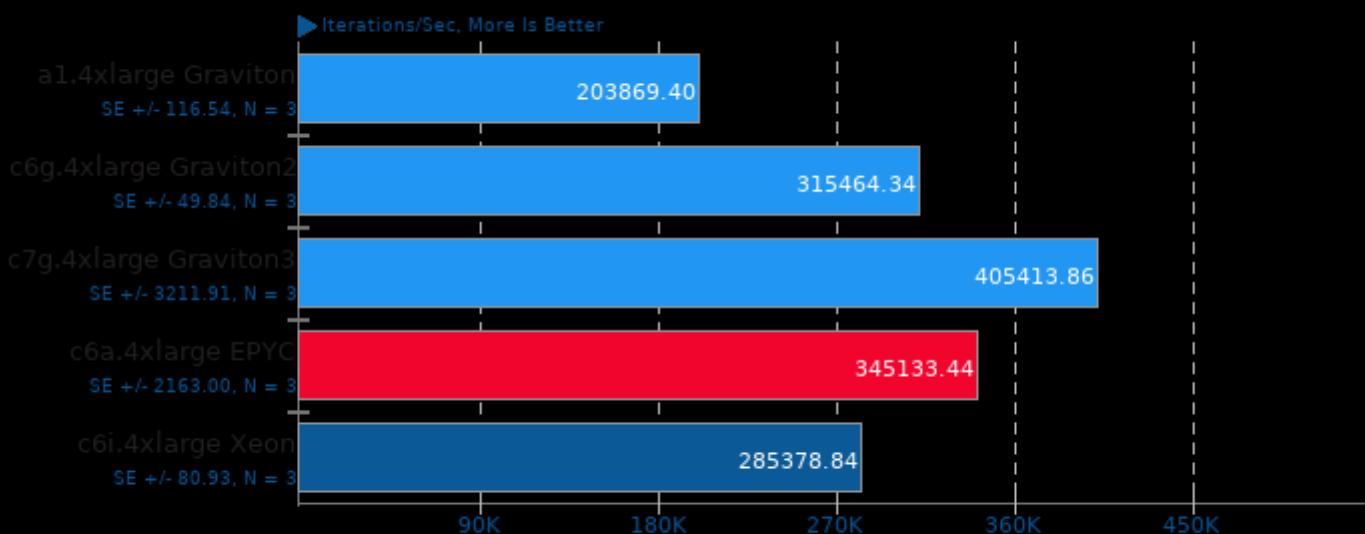
Sustained Floating-Point Rate



1. (CC) gcc options: -O3 -march=native -fopenmp

Coremark 1.0

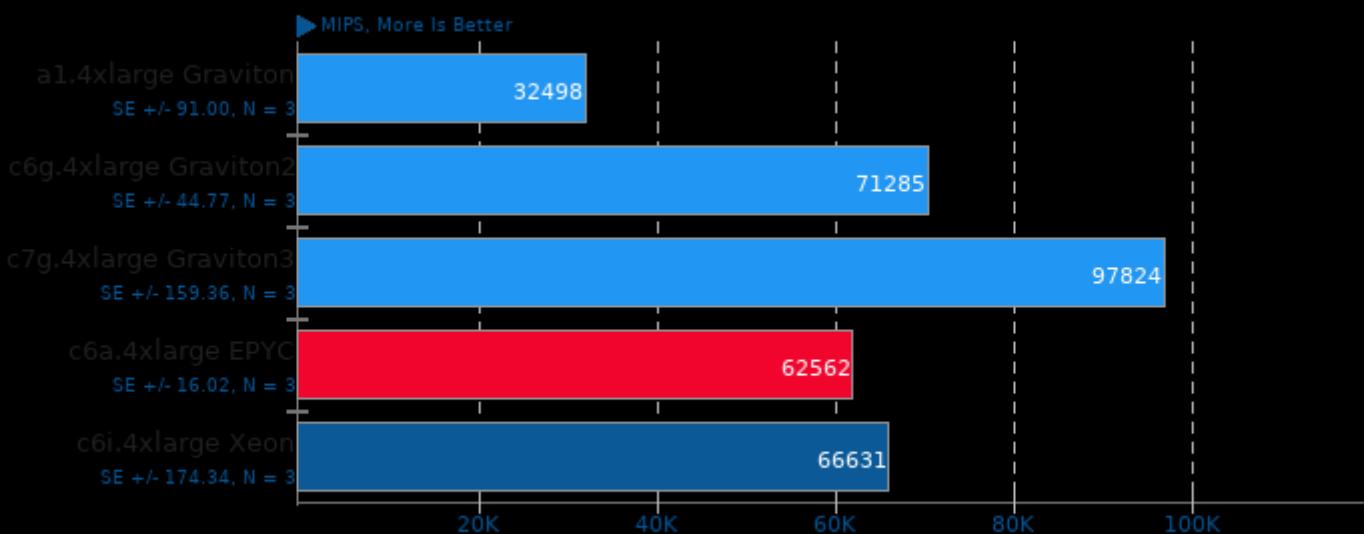
CoreMark Size 666 - Iterations Per Second



1. (CC) gcc options: -O2 -fintc -fintt

7-Zip Compression 21.06

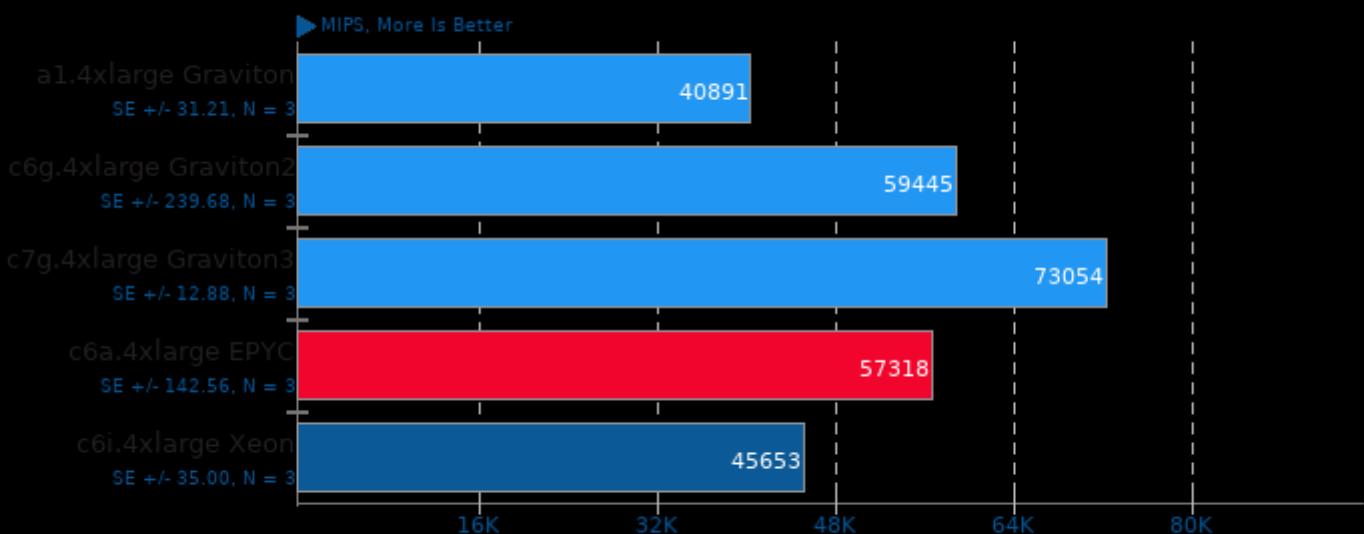
Test: Compression Rating



1. (CXX) g++ options: -lpthread -ldl -O2 -fPIC

7-Zip Compression 21.06

Test: Decompression Rating

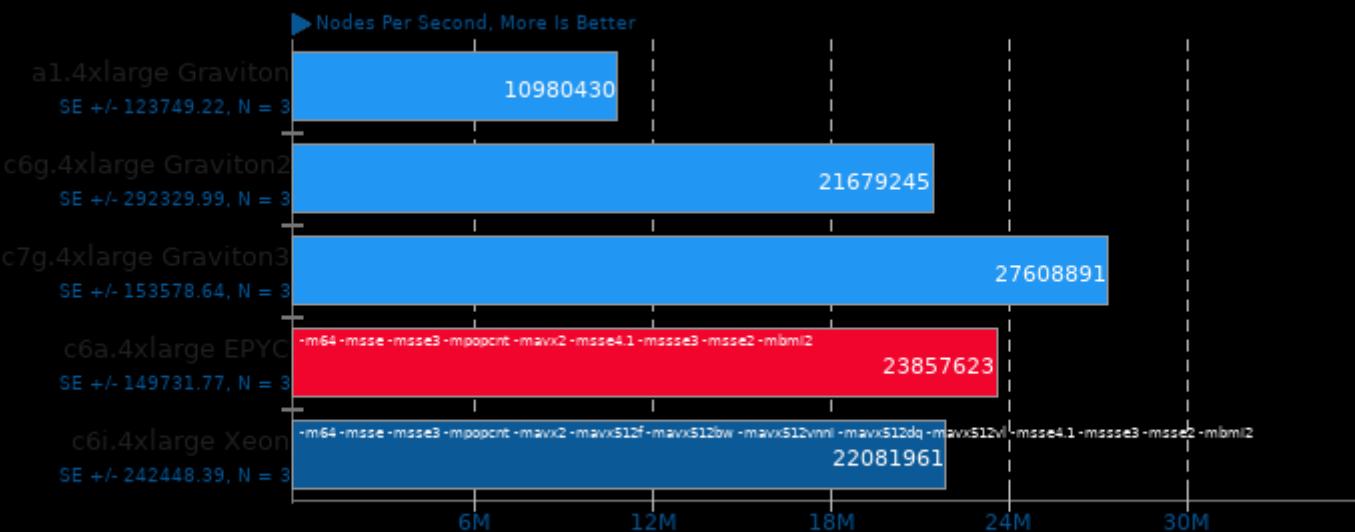


1. (CXX) g++ options: -lpthread -ldl -O2 -fPIC

Amazon EC2 Graviton3 Benchmark Comparison

Stockfish 13

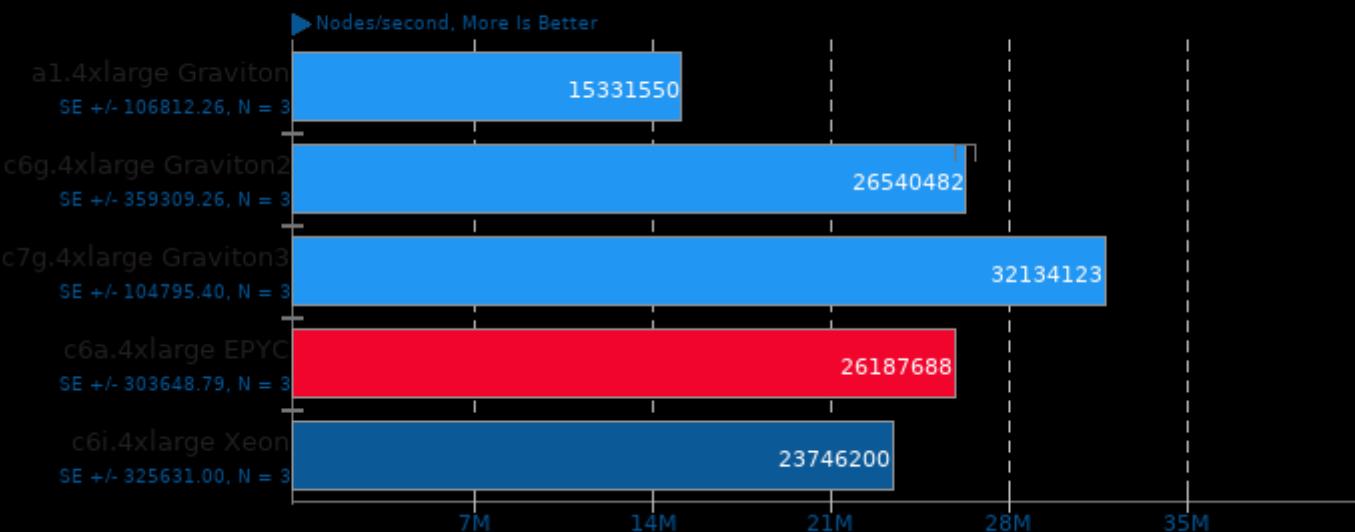
Total Time



1. (CXX) g++ options: -lgcov -lpthread -fno-exceptions -std=c++17 -fprofile-use -fno-peel-loops -fno-tracer -pedantic -O3 -fipa -fipa=jobserver

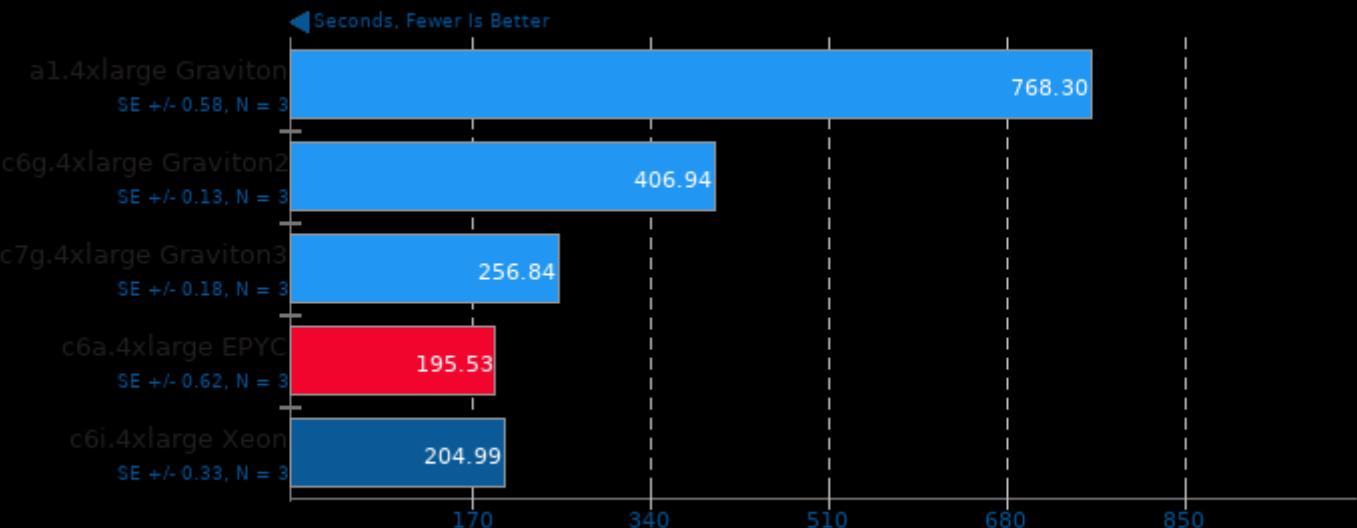
asmFish 2018-07-23

1024 Hash Memory, 26 Depth



libavif avifenc 0.10

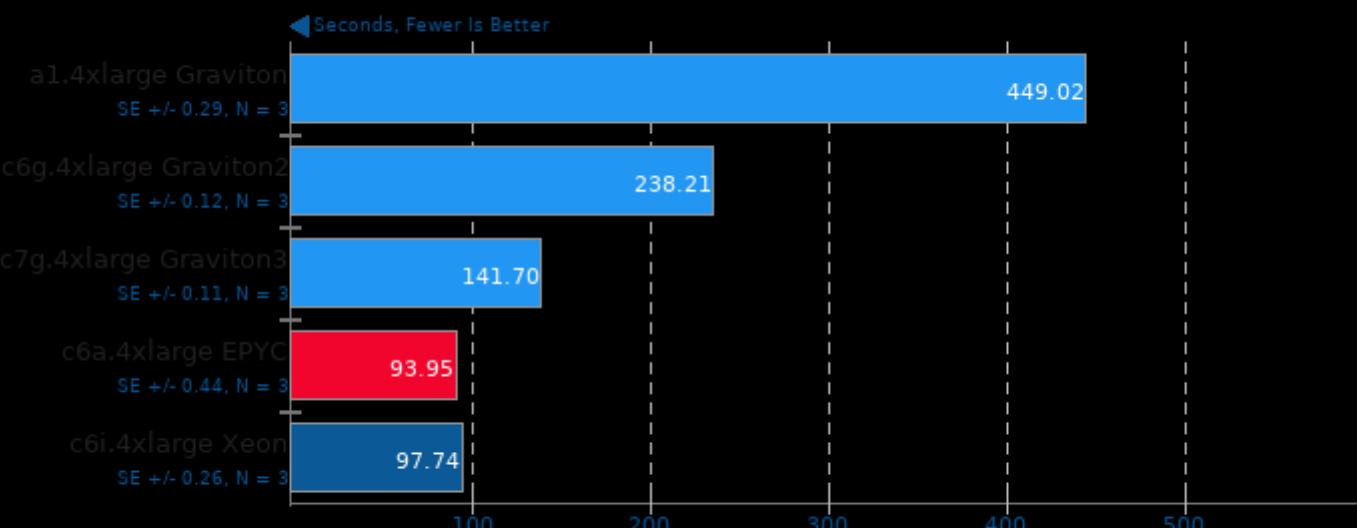
Encoder Speed: 0



1. (CXX) g++ options: -O3 -fPIC -lm

libavif avifenc 0.10

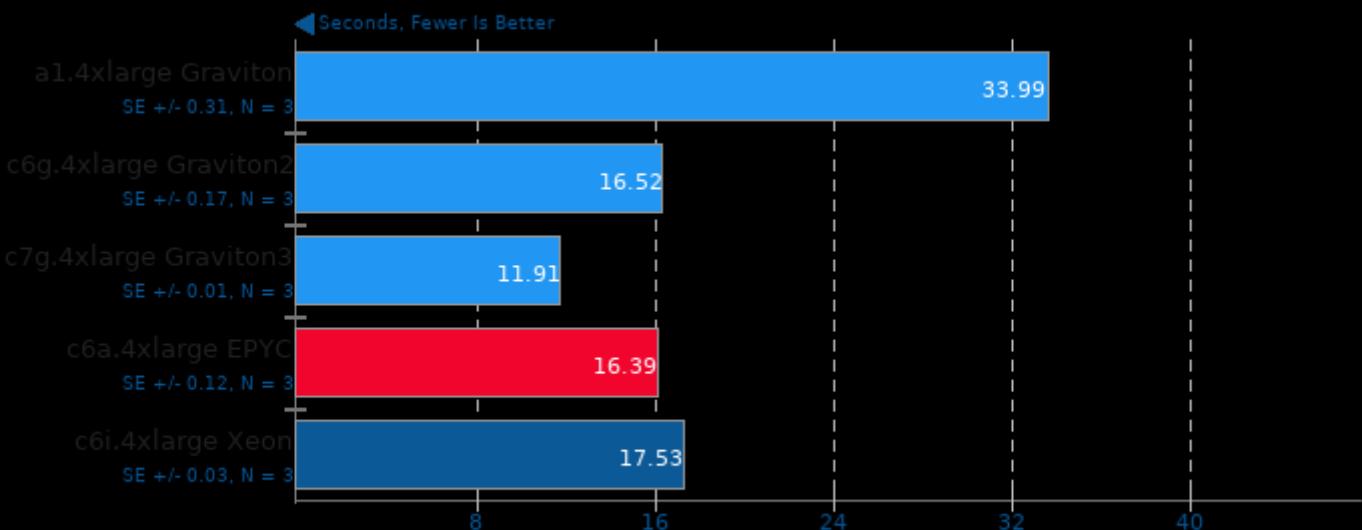
Encoder Speed: 2



1. (CXX) g++ options: -O3 -fPIC -lm

libavif avifenc 0.10

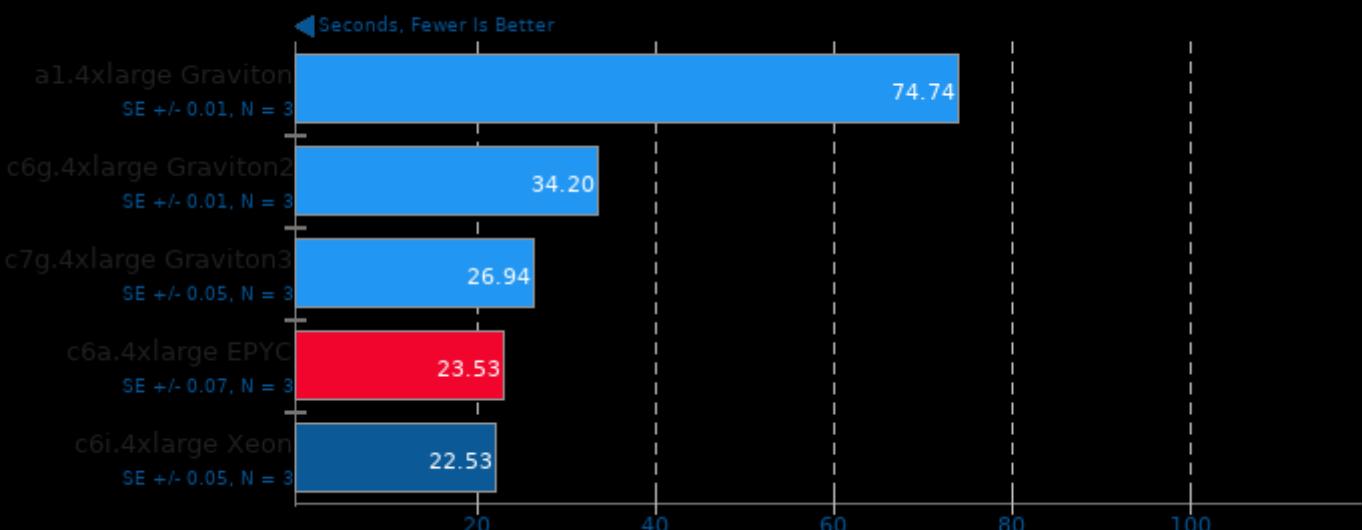
Encoder Speed: 6, Lossless



1. (CXX) g++ options: -O3 -fPIC -lm

Timed Apache Compilation 2.4.41

Time To Compile



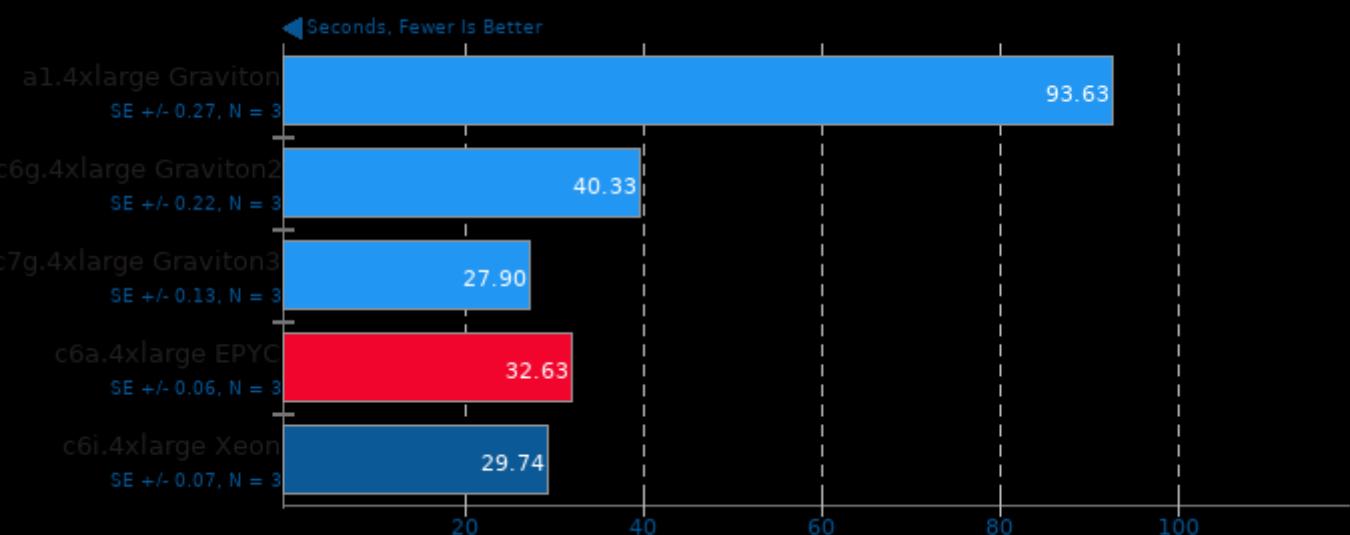
Timed Gem5 Compilation 21.2

Time To Compile



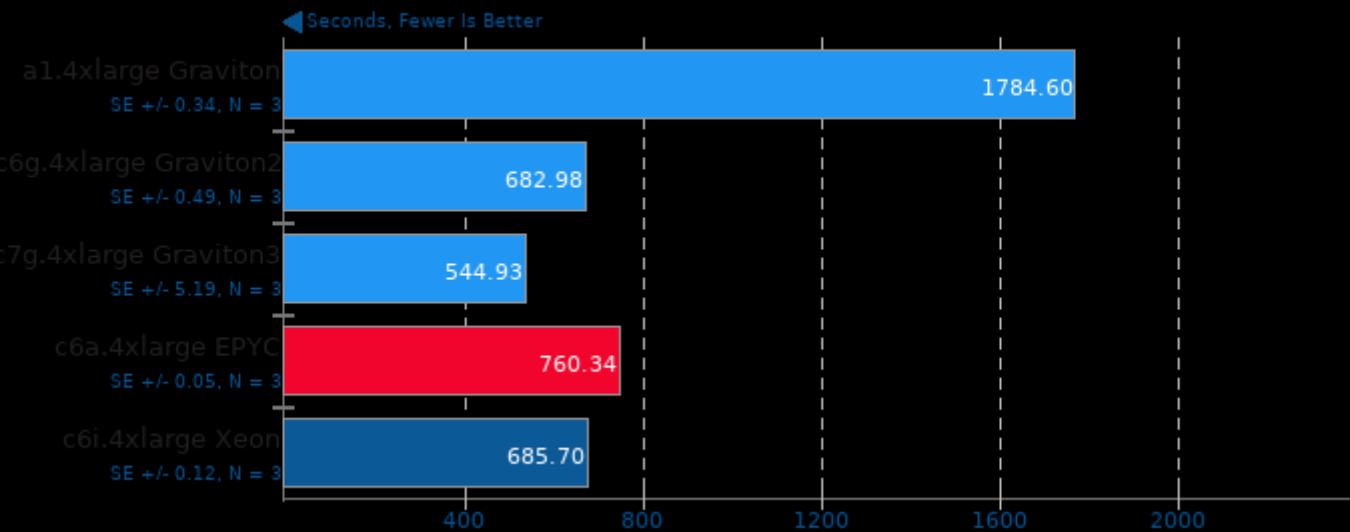
Timed ImageMagick Compilation 6.9.0

Time To Compile



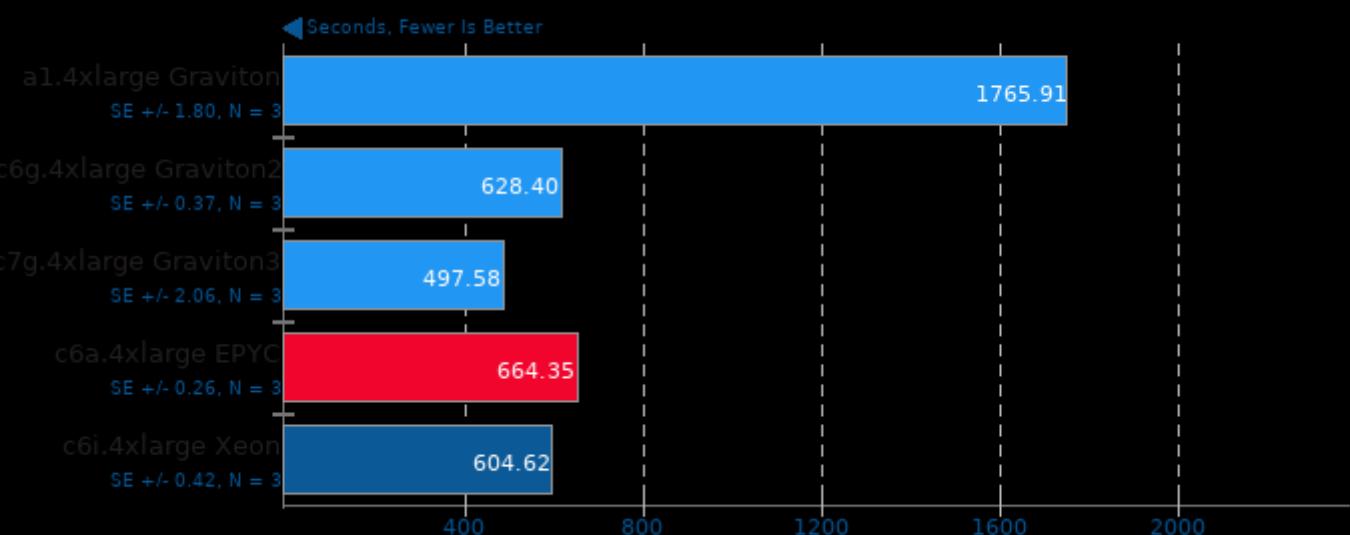
Timed LLVM Compilation 13.0

Build System: Ninja



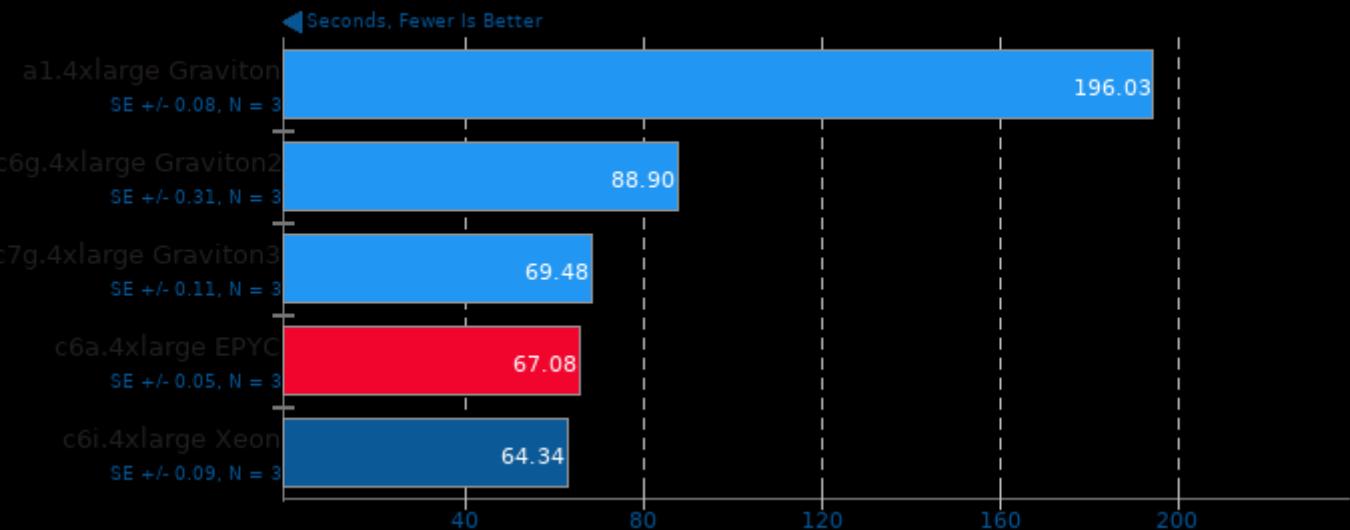
Timed Node.js Compilation 17.3

Time To Compile



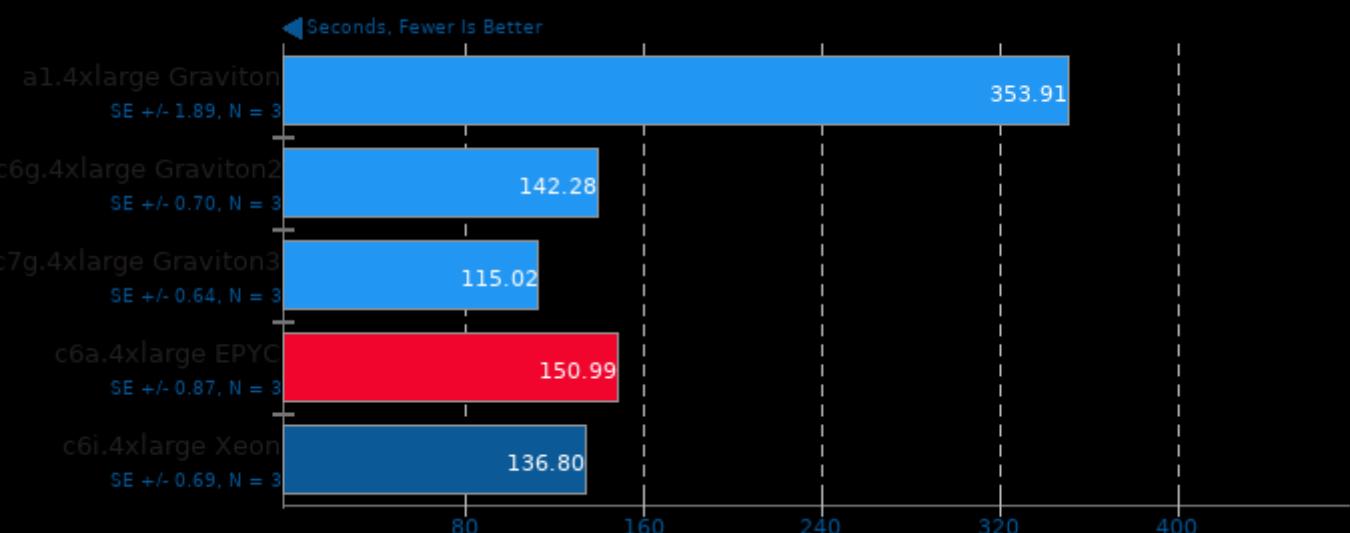
Timed PHP Compilation 7.4.2

Time To Compile



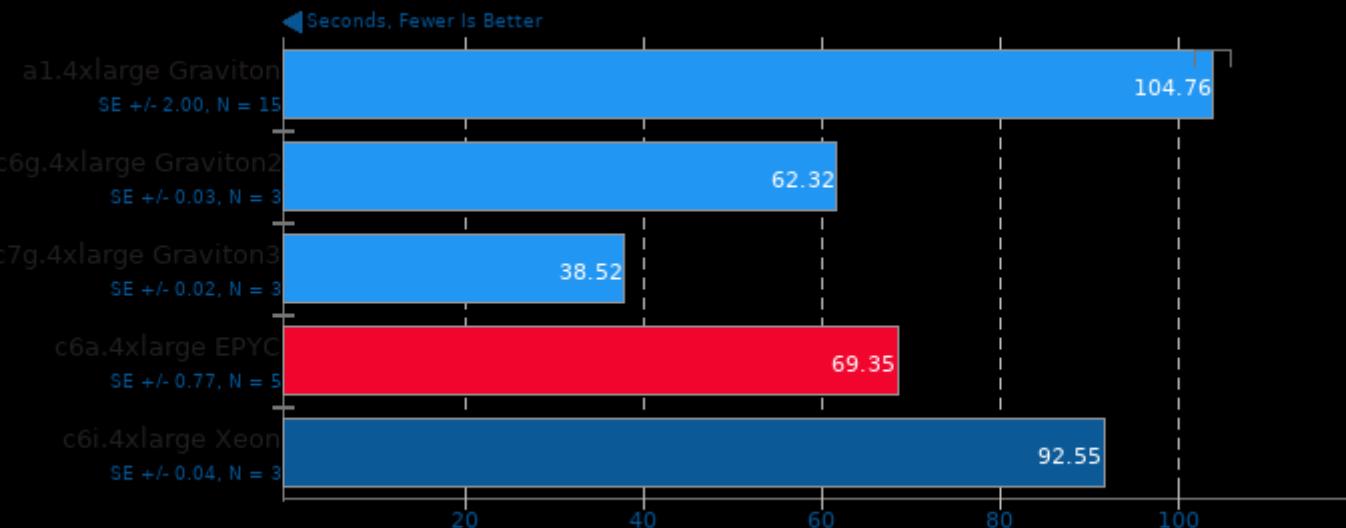
Build2 0.13

Time To Compile



C-Ray 1.1

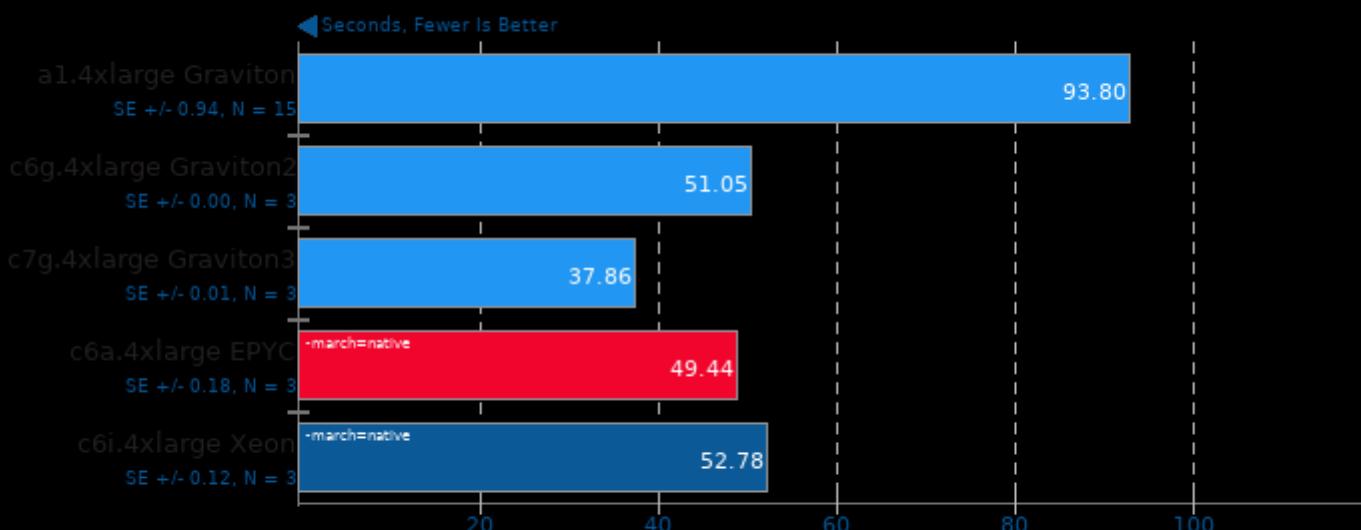
Total Time - 4K, 16 Rays Per Pixel



1. (CC) gcc options: -lm -pthread -O3

POV-Ray 3.7.0.7

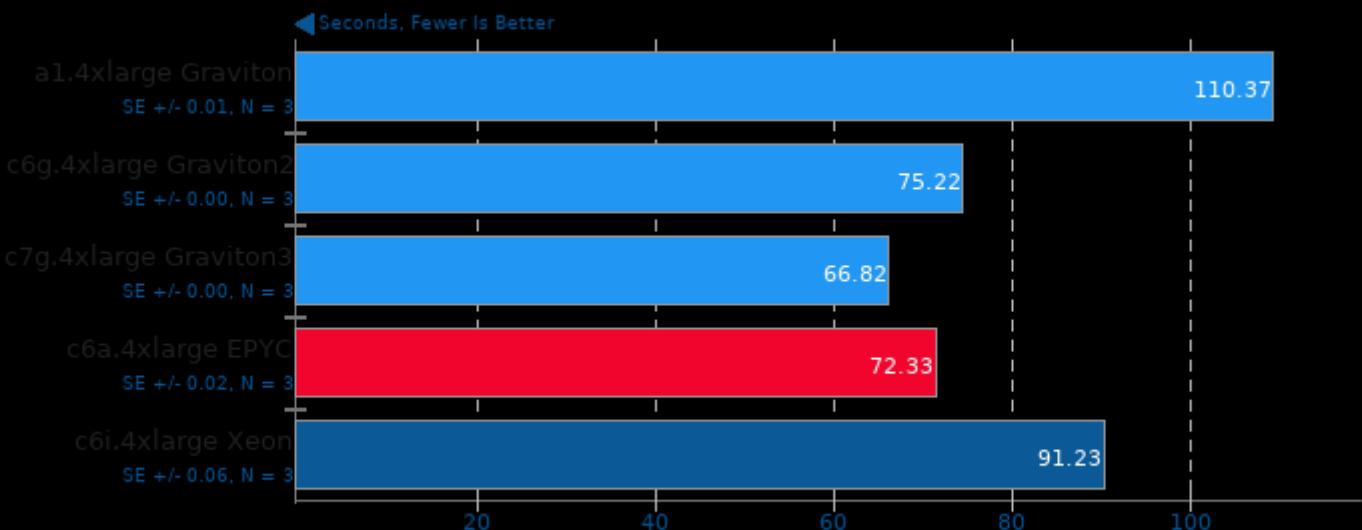
Trace Time



1. (CXX) g++ options: -pipe -O3 -ffast-math -R/usr/lib -lXpm -lSM -ICE -lX11 -ltiff -jpeg -lpng -lz -lrt -lm -lboost_thread -lboost_system

m-queens 1.2

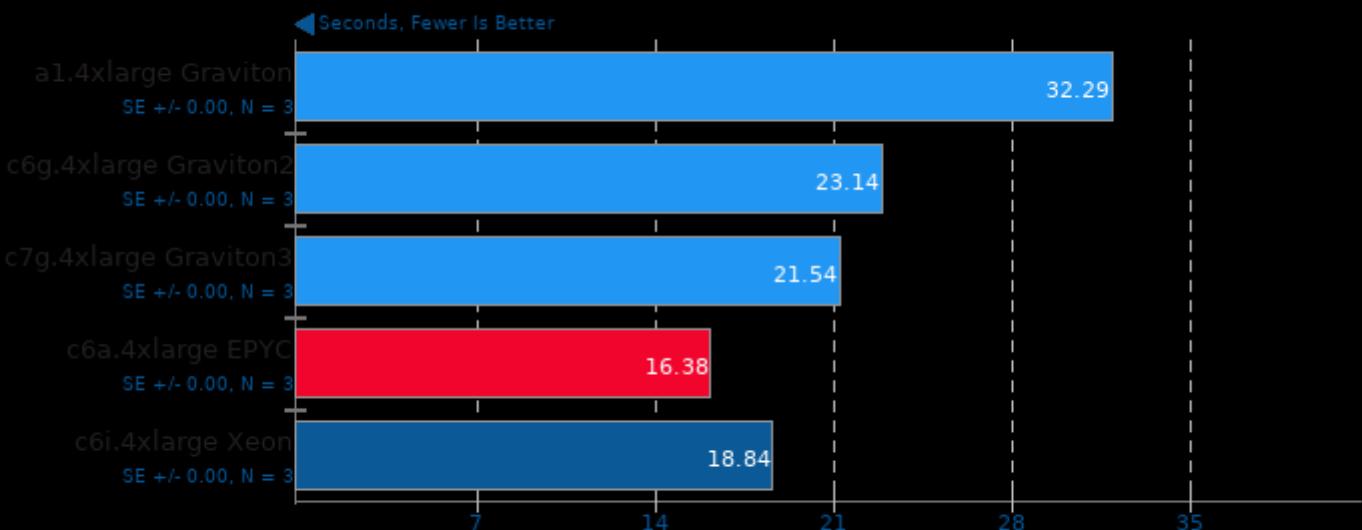
Time To Solve



1. (CXX) g++ options: -fopenmp -O2 -march=native

N-Queens 1.0

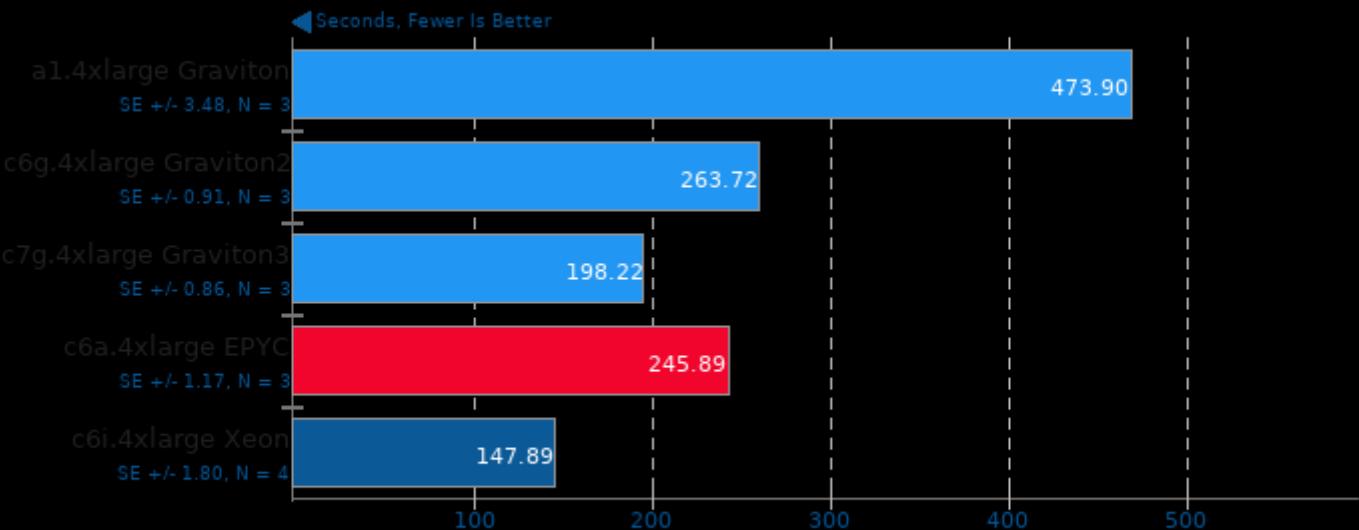
Elapsed Time



1. (CC) gcc options: -static -fopenmp -O3 -march=native

Ngspice 34

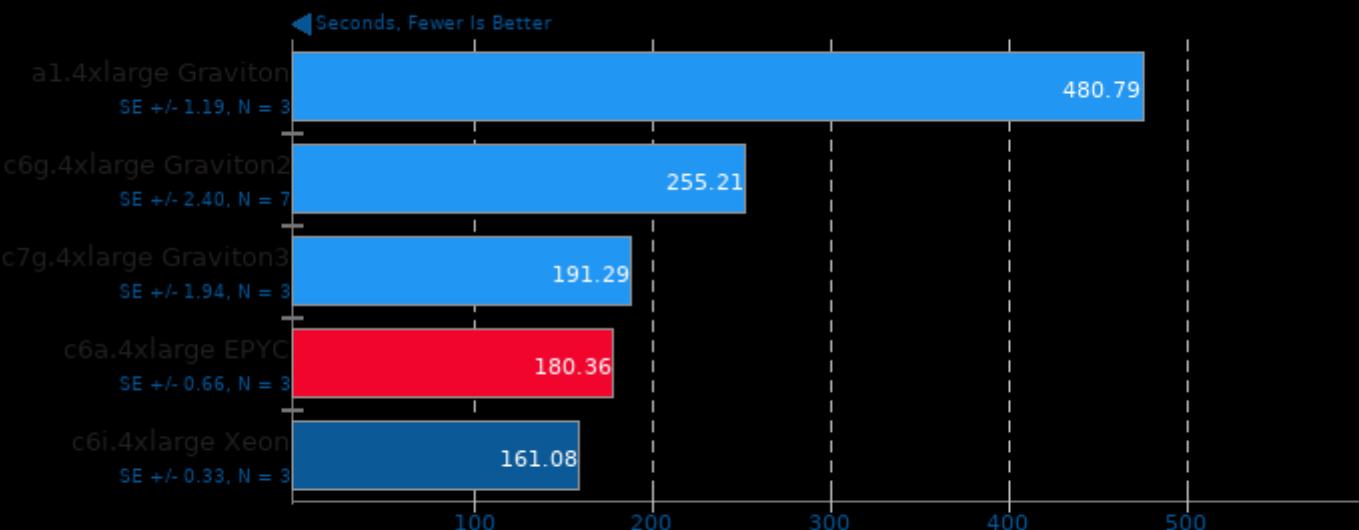
Circuit: C2670



1. (CC) gcc options: -O0 -fopenmp -lm -stdc++ -fftw3 -lXaw -lXmu -lXt -lXext -lX11 -lXft -lfontconfig -lXrender -lfreetype -lSM -lICE

Ngspice 34

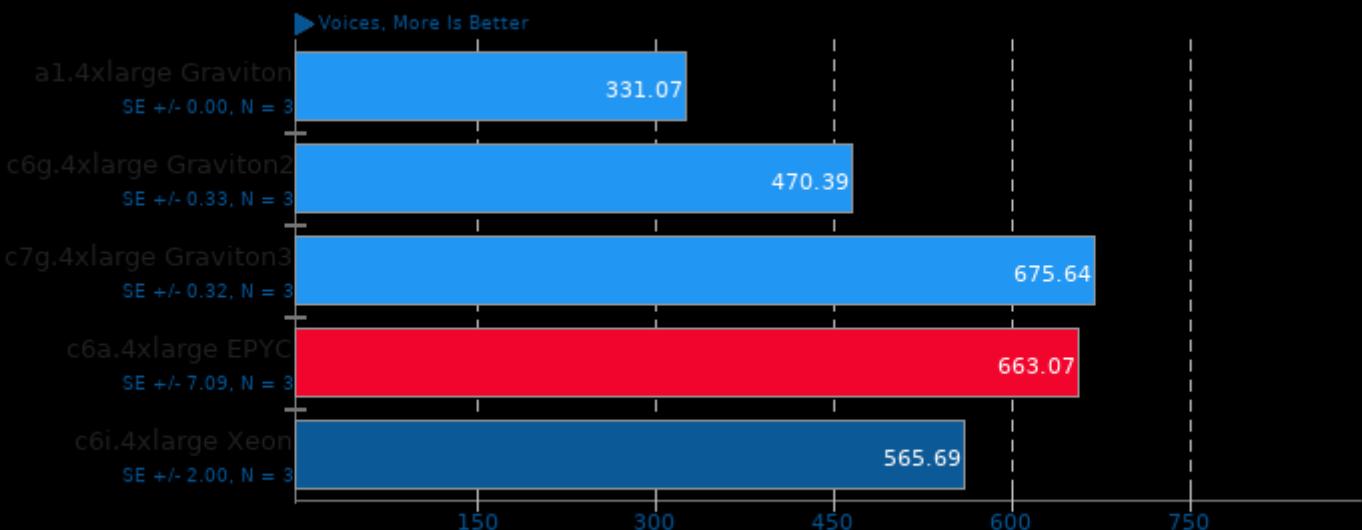
Circuit: C7552



1. (CC) gcc options: -O0 -fopenmp -lm -stdc++ -fftw3 -lXaw -lXmu -lXt -lXext -lX11 -lXft -lfontconfig -lXrender -lfreetype -lSM -lICE

Google SynthMark 20201109

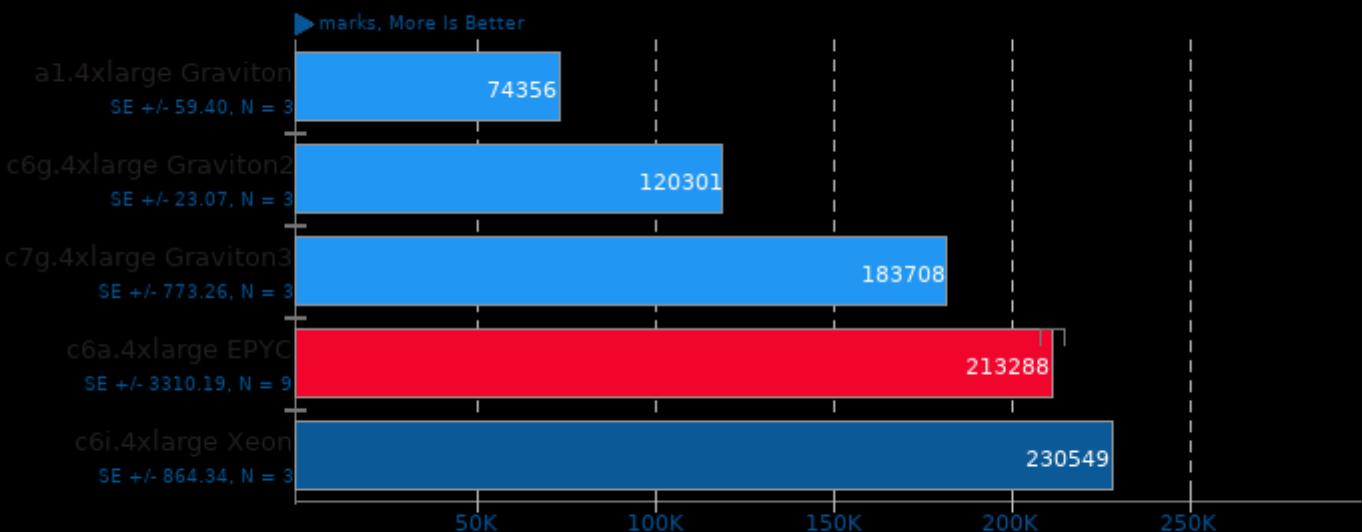
Test: VoiceMark_100



1. (CXX) g++ options: -fopenmp -fno-rtti -fno-threadsafe-statics -std=c++11 -Ofast

SecureMark 1.0.4

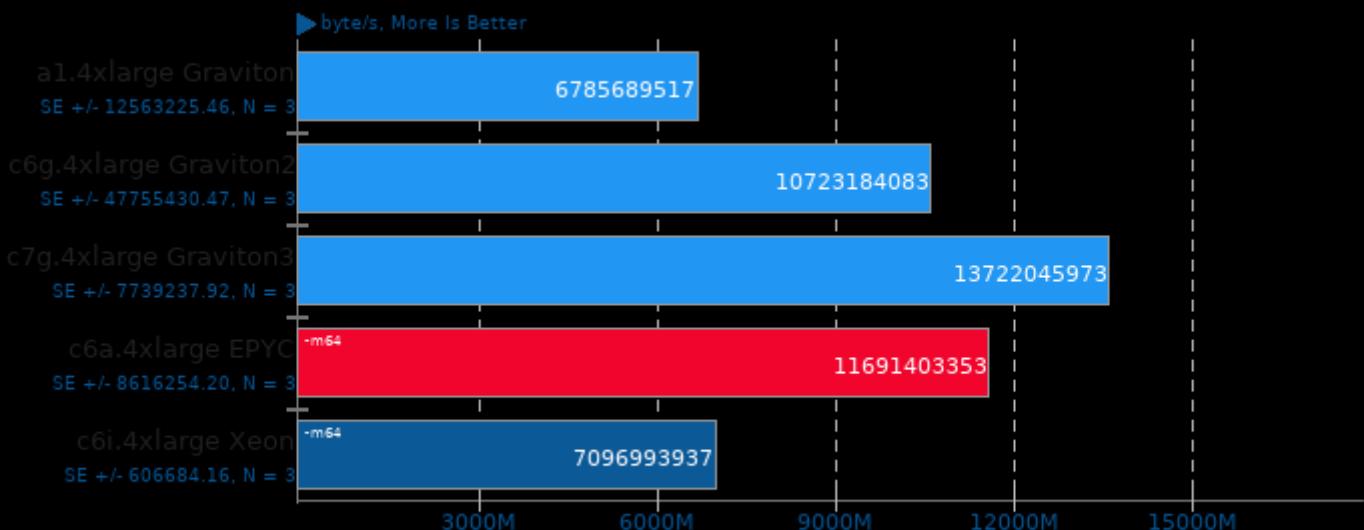
Benchmark: SecureMark-TLS



1. (CC) gcc options: -pedantic -O3

OpenSSL 3.0

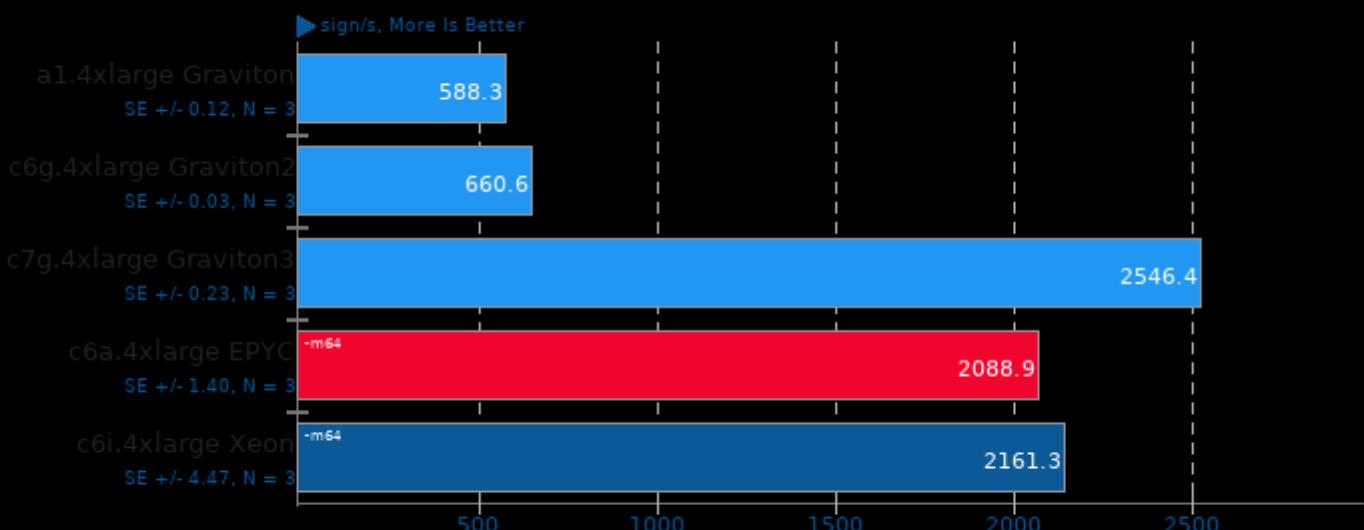
Algorithm: SHA256



1. (CC) gcc options: -pthread -O3 -lssl -lcrypto -ldl

OpenSSL 3.0

Algorithm: RSA4096

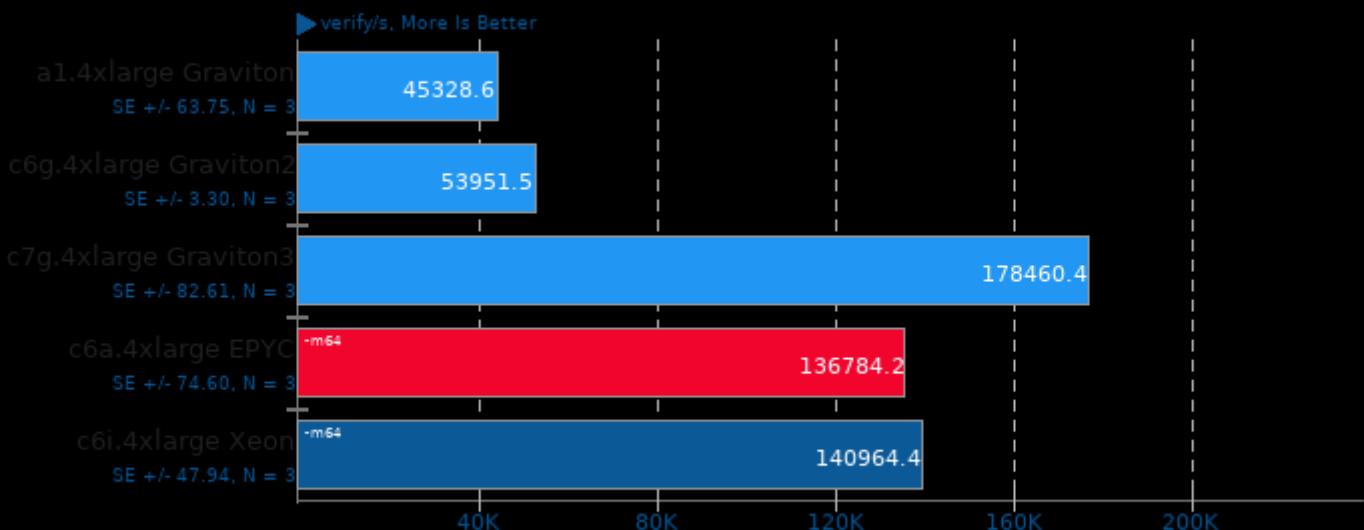


1. (CC) gcc options: -pthread -O3 -lssl -lcrypto -ldl

Amazon EC2 Graviton3 Benchmark Comparison

OpenSSL 3.0

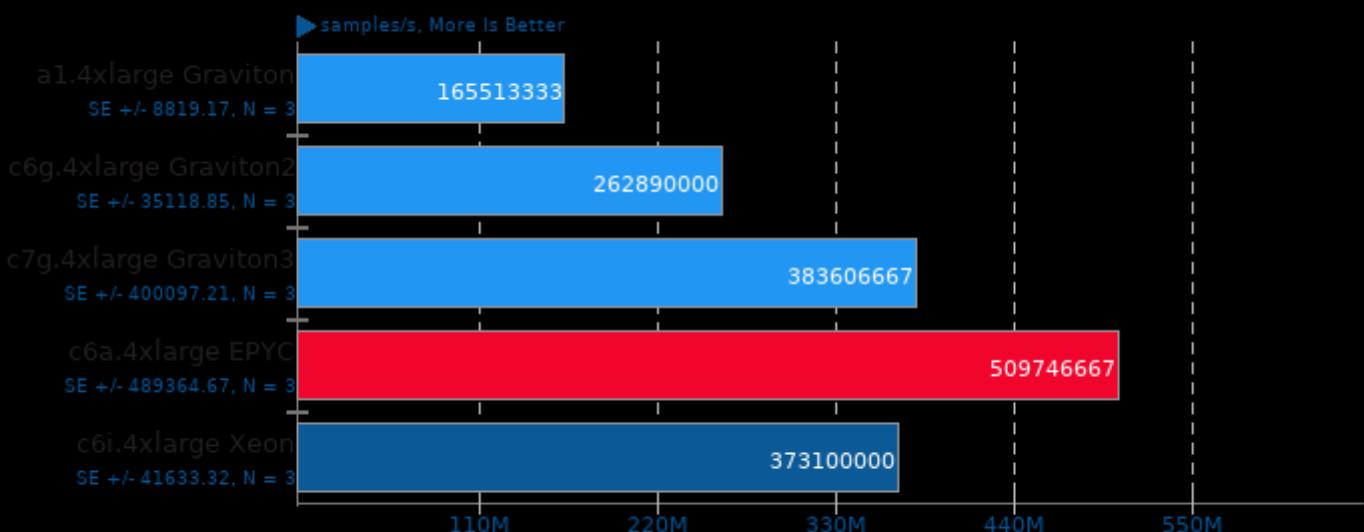
Algorithm: RSA4096



1. (CC) gcc options: -O3 -pthread -lssl -lcrypto -ldl

Liquid-DSP 2021.01.31

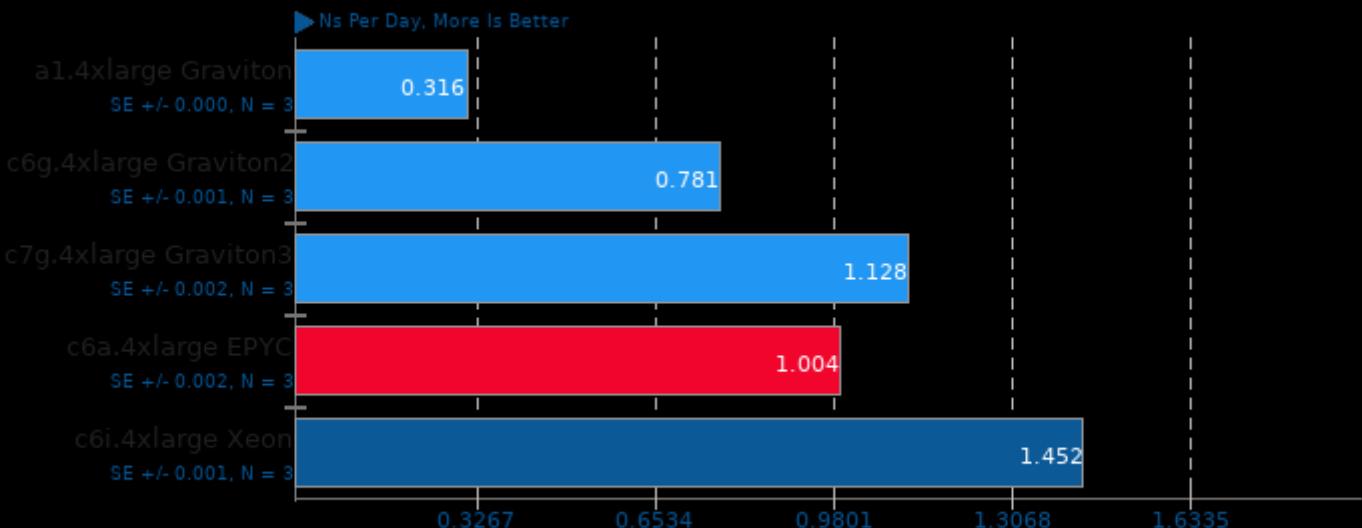
Threads: 16 - Buffer Length: 256 - Filter Length: 57



1. (CC) gcc options: -O3 -pthread -lm -lc -lliquid

GROMACS 2022.1

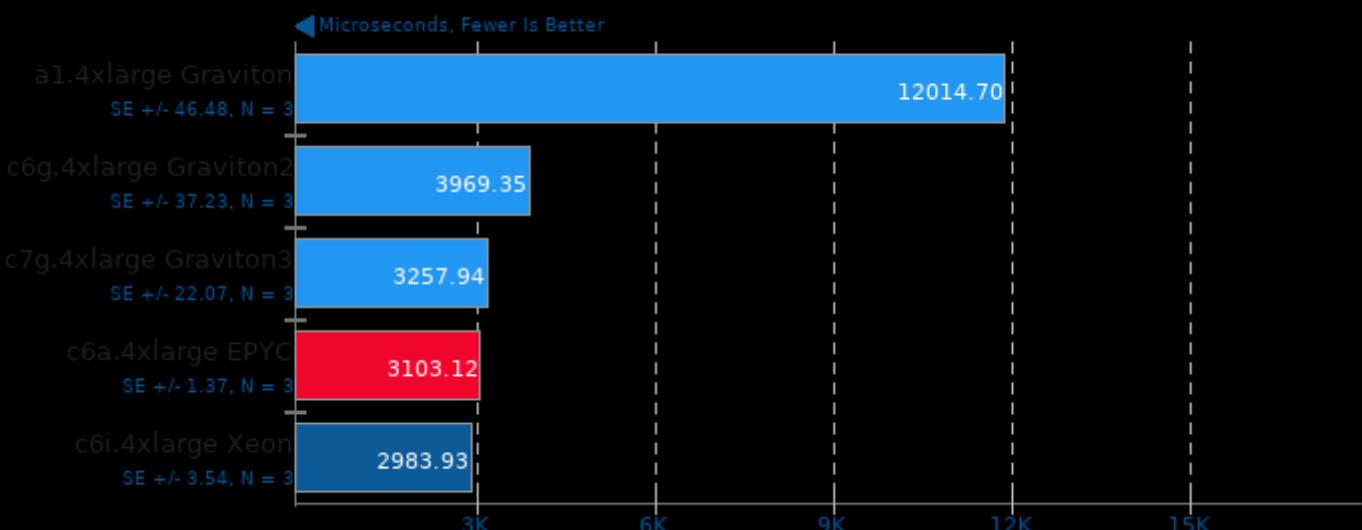
Implementation: MPI CPU - Input: water_GMX50_bare



1. (CXX) g++ options: -O3

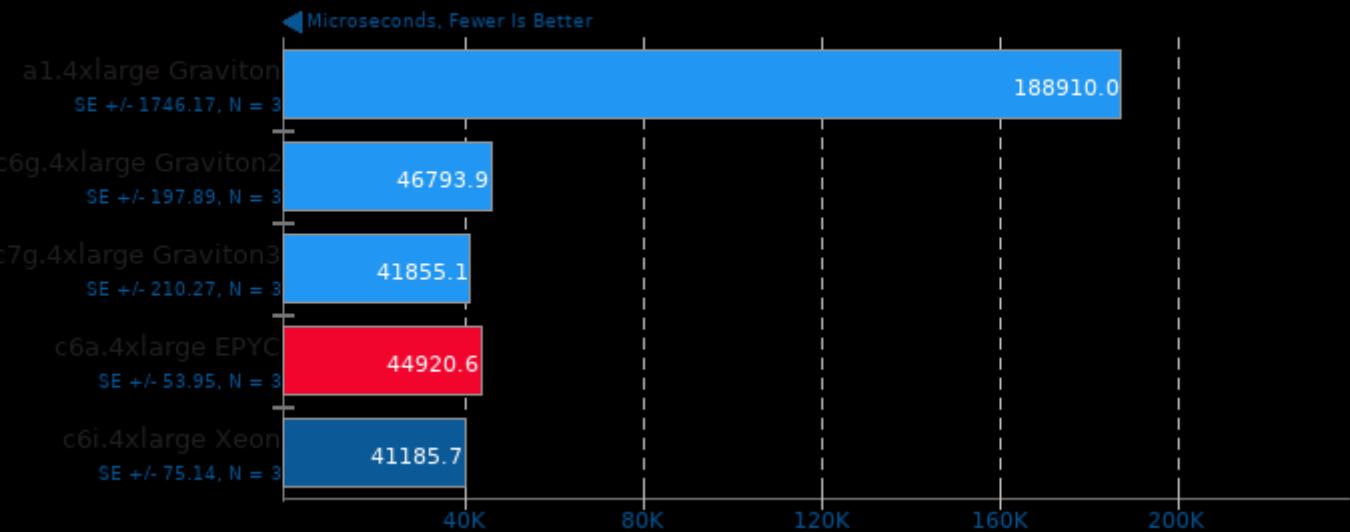
TensorFlow Lite 2022-05-18

Model: SqueezeNet



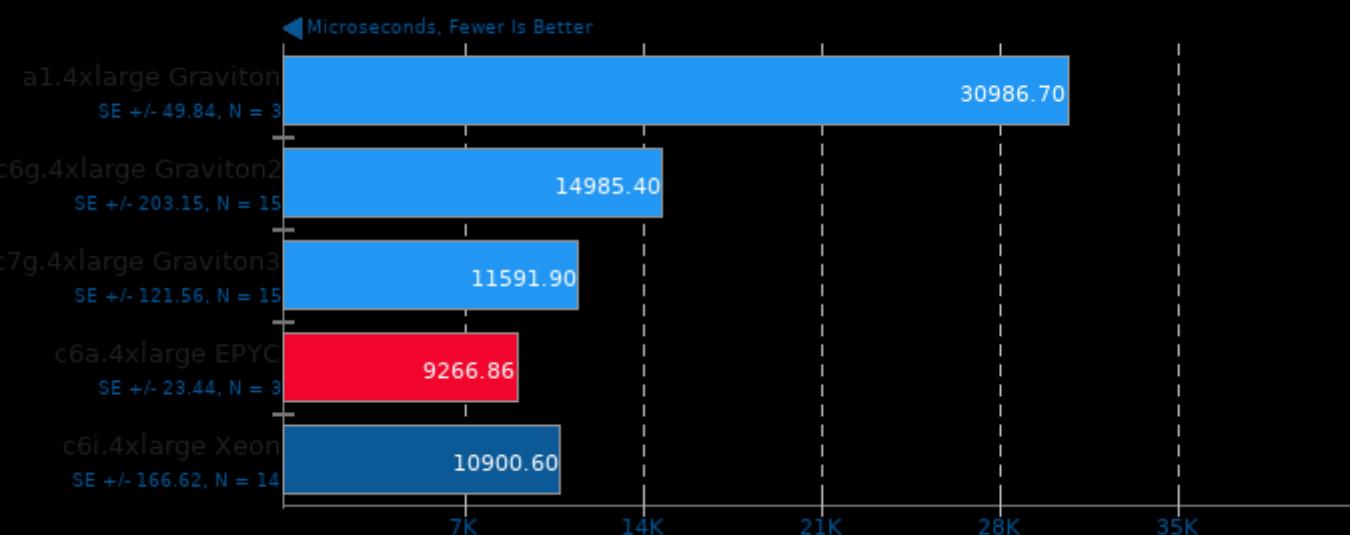
TensorFlow Lite 2022-05-18

Model: Inception V4



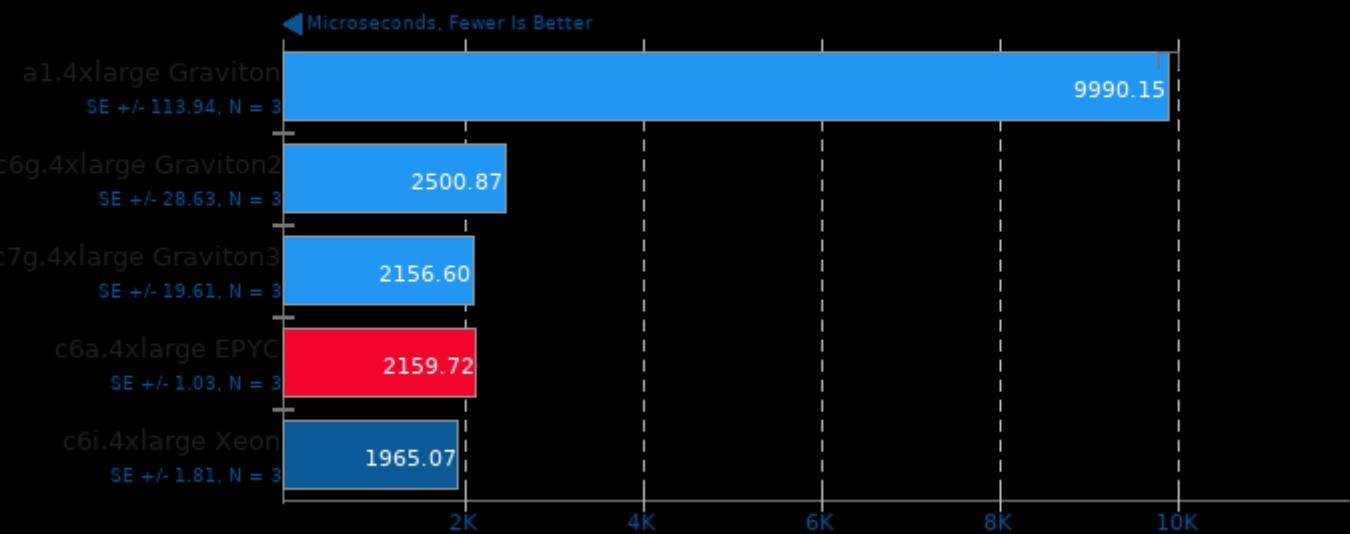
TensorFlow Lite 2022-05-18

Model: NASNet Mobile



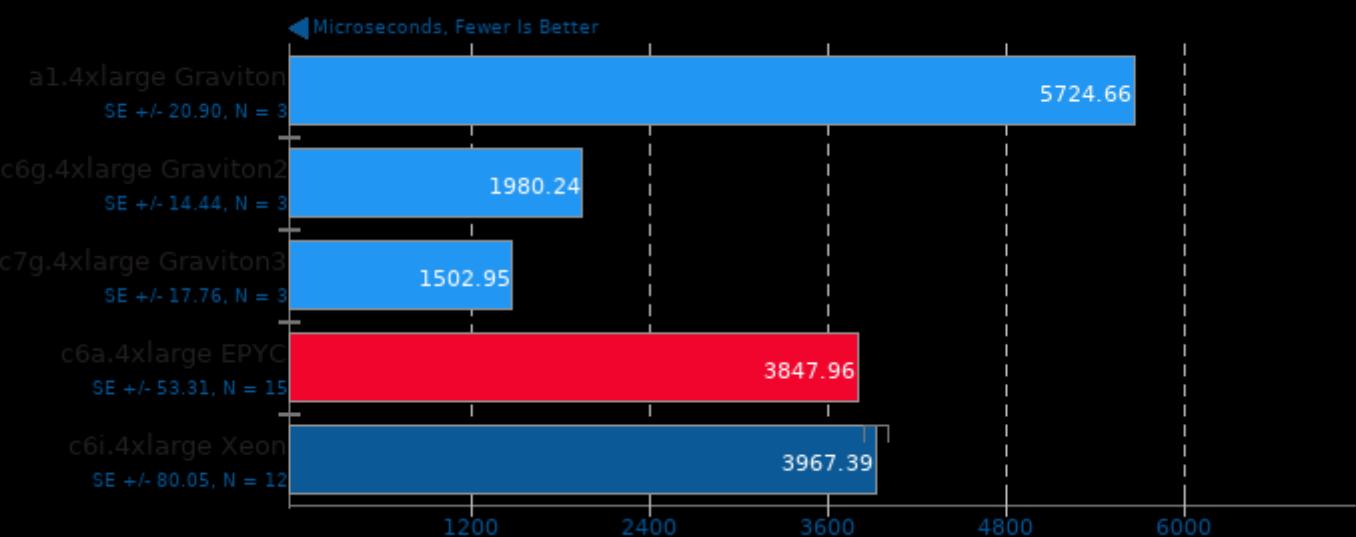
TensorFlow Lite 2022-05-18

Model: Mobilenet Float



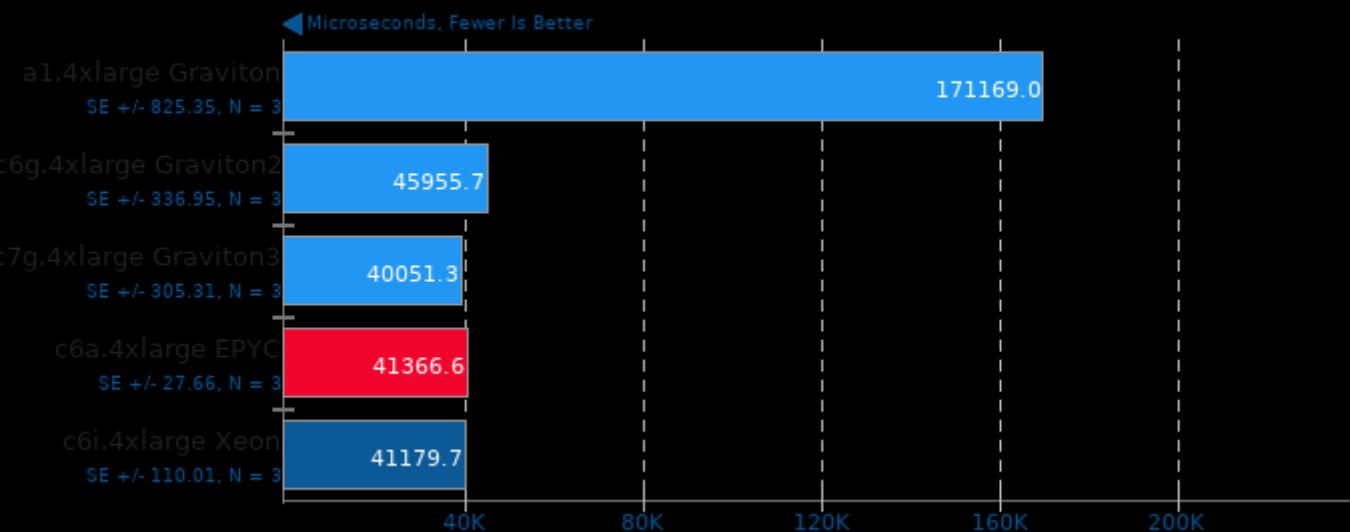
TensorFlow Lite 2022-05-18

Model: Mobilenet Quant



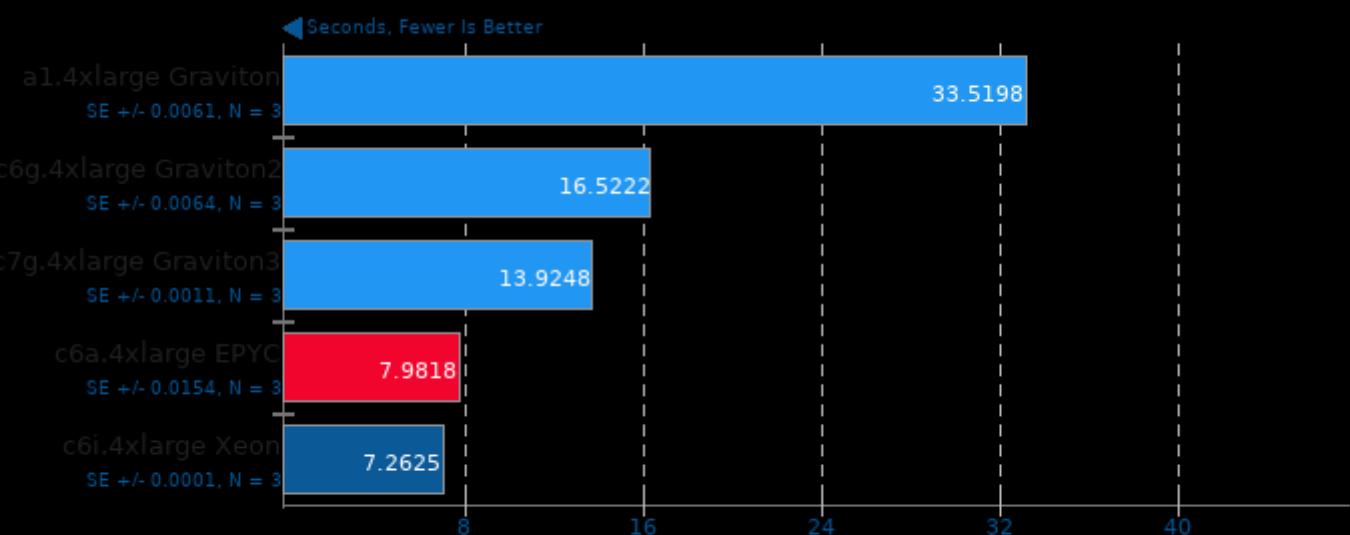
TensorFlow Lite 2022-05-18

Model: Inception ResNet V2



ASTC Encoder 3.2

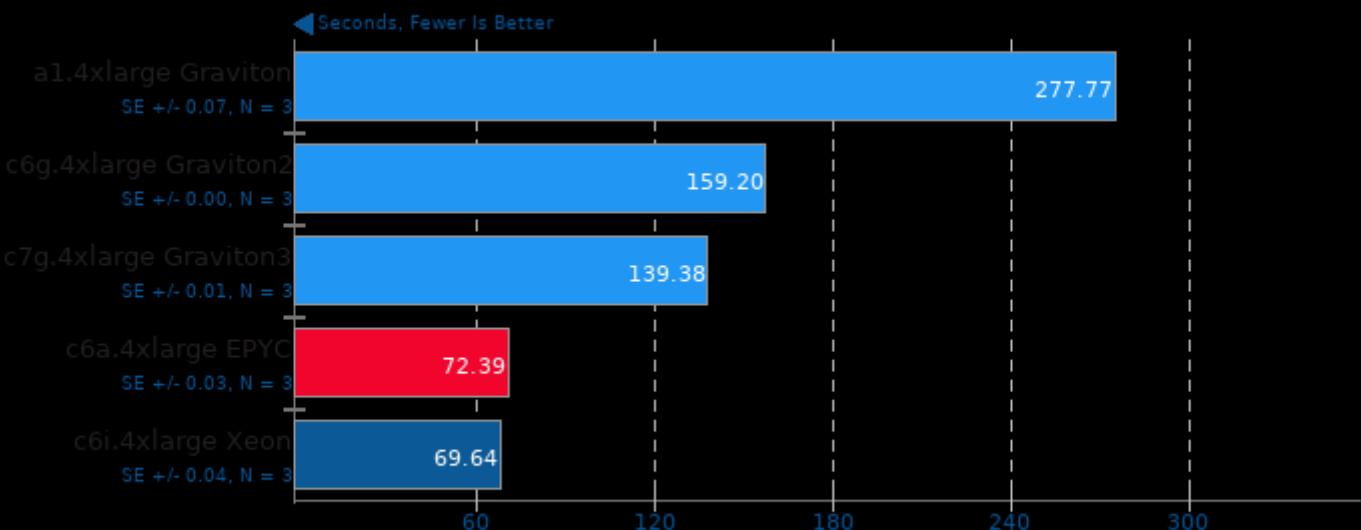
Preset: Thorough



1. (CXX) g++ options: -O3 -fno -pthread

ASTC Encoder 3.2

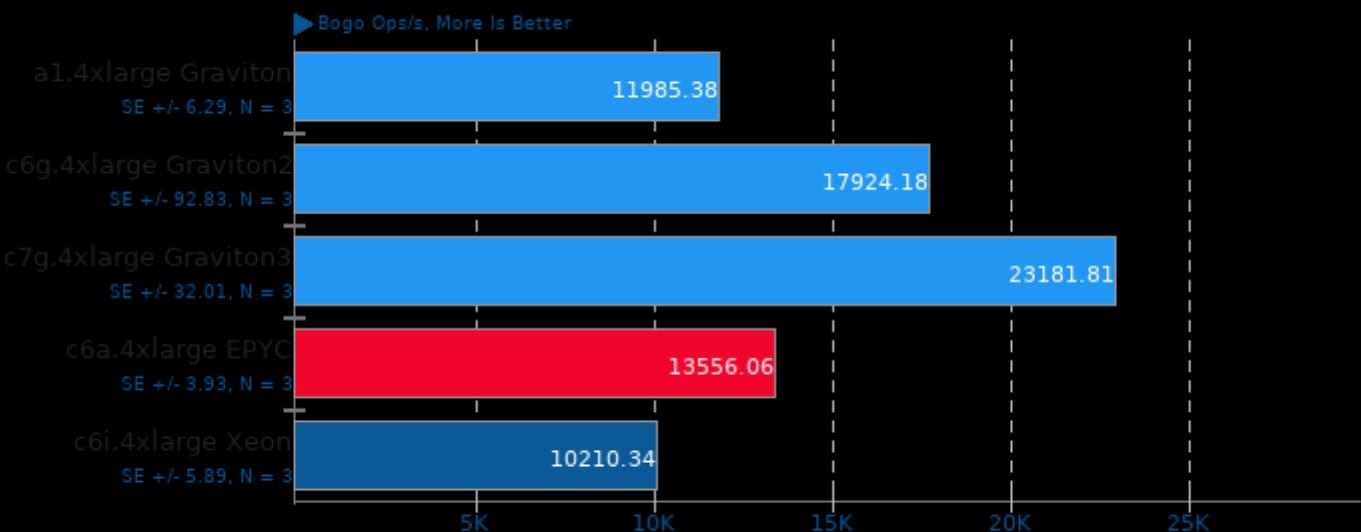
Preset: Exhaustive



1. (CXX) g++ options: -O3 -fno -pthread

Stress-NG 0.14

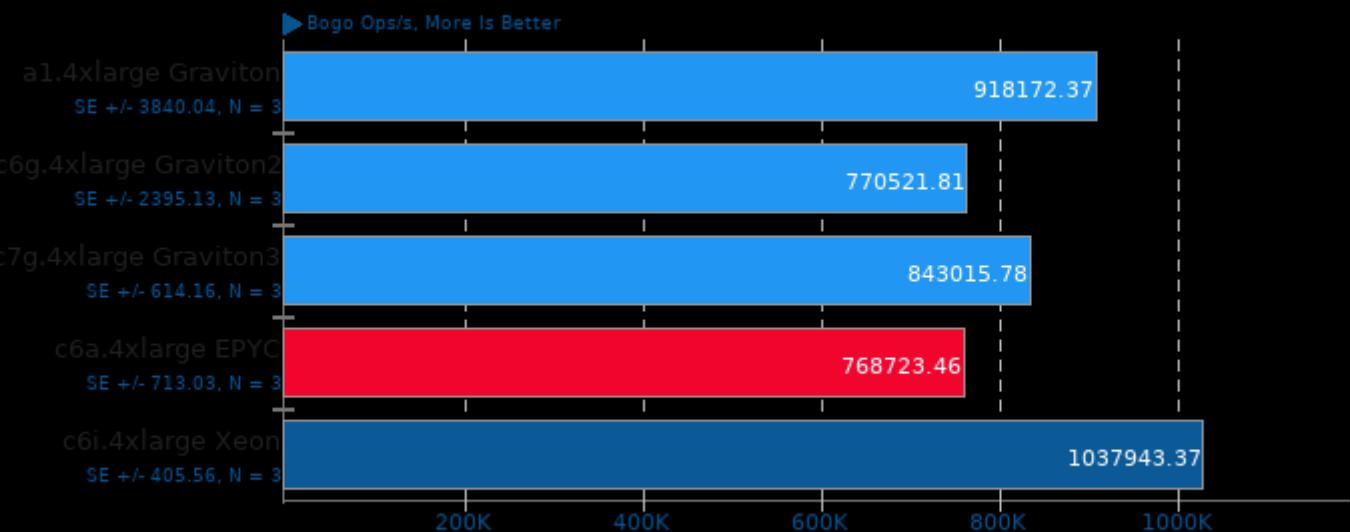
Test: Crypto



1. (CC) gcc options: -O2 -std=gnu99 -lm -lapparmor -latomic -lc -lcrypt -ldl -ljpeg -lrt -lz -pthread

Stress-NG 0.14

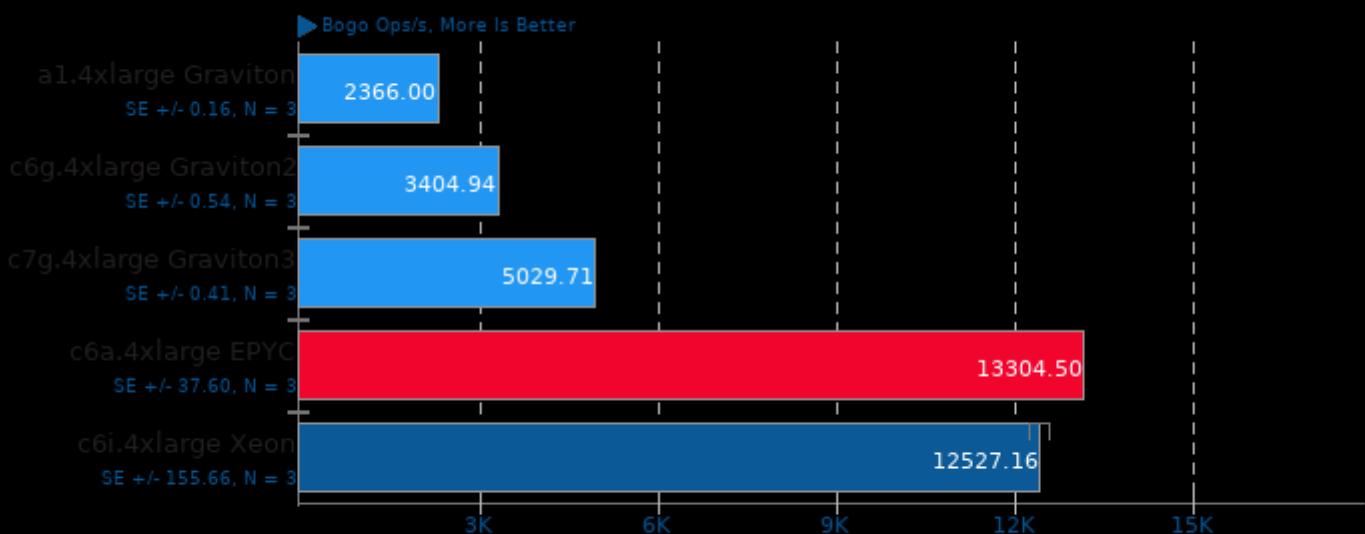
Test: IO_uring



1. (CC) gcc options: -O2 -std=gnu99 -lm -lapparmor -latomic -lc -lcrypt -ldl -ljpeg -lrt -lz -pthread

Stress-NG 0.14

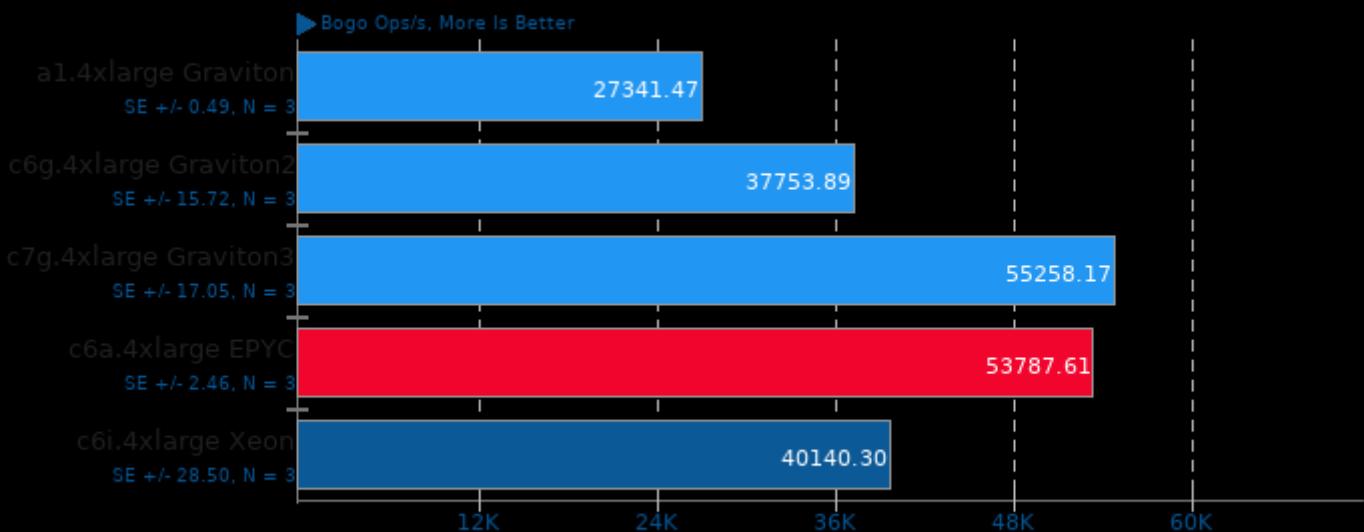
Test: CPU Stress



1. (CC) gcc options: -O2 -std=gnu99 -lm -lapparmor -latomic -lc -lcrypt -ldl -ljpeg -lrt -lz -pthread

Stress-NG 0.14

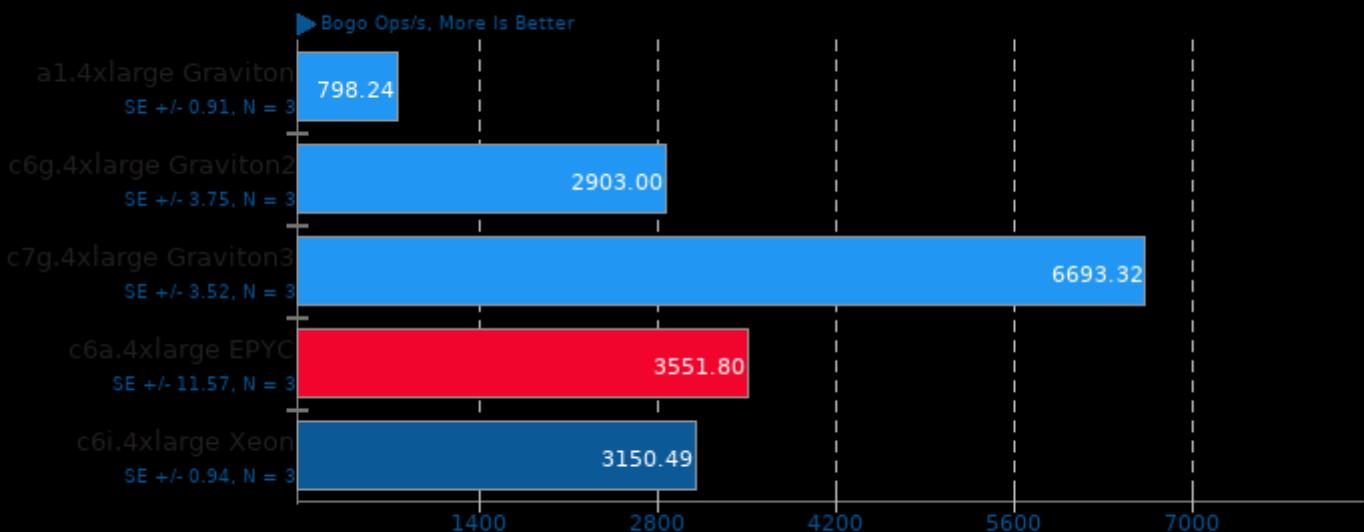
Test: Vector Math



1. (CC) gcc options: -O2 -std=gnu99 -lm -lapparmor -latomic -lc -lcrypt -ldl -ljpeg -lrt -lz -pthread

Stress-NG 0.14

Test: Memory Copying

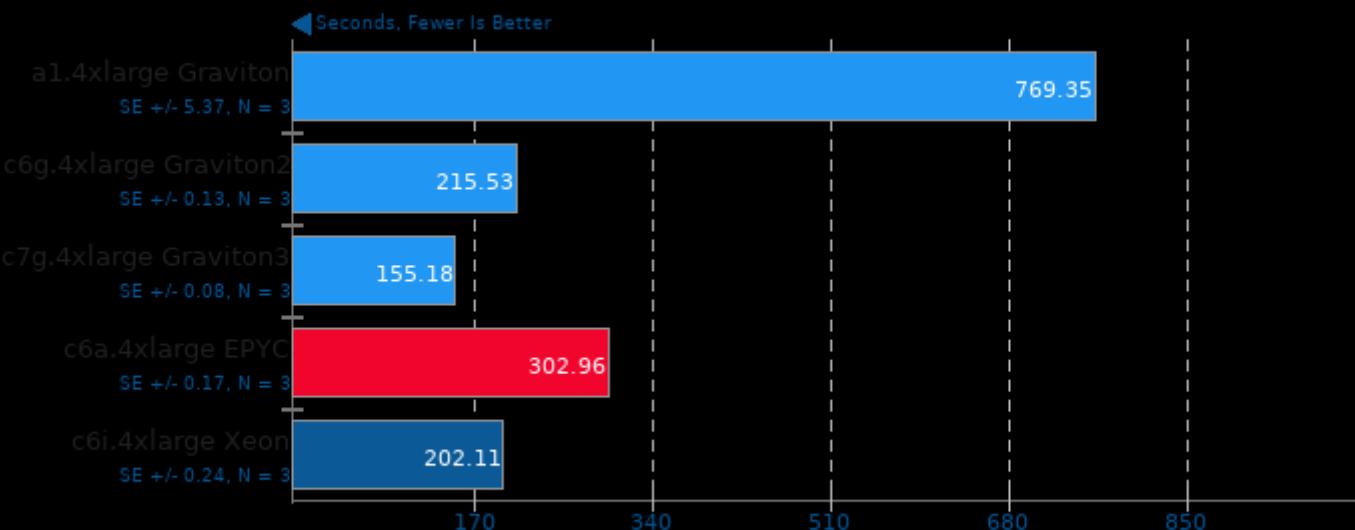


1. (CC) gcc options: -O2 -std=gnu99 -lm -lapparmor -latomic -lc -lcrypt -ldl -ljpeg -lrt -lz -pthread

Amazon EC2 Graviton3 Benchmark Comparison

GPAW 22.1

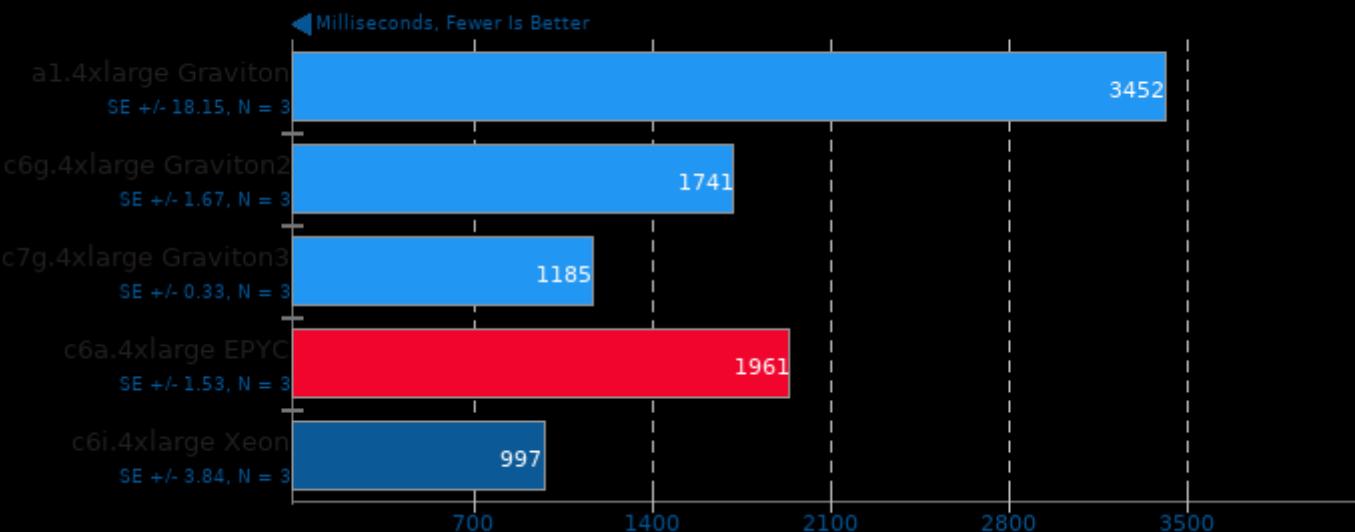
Input: Carbon Nanotube



1. (CC) gcc options: -fshared -fwrapv -O2 -lxc -lblas -lmpi

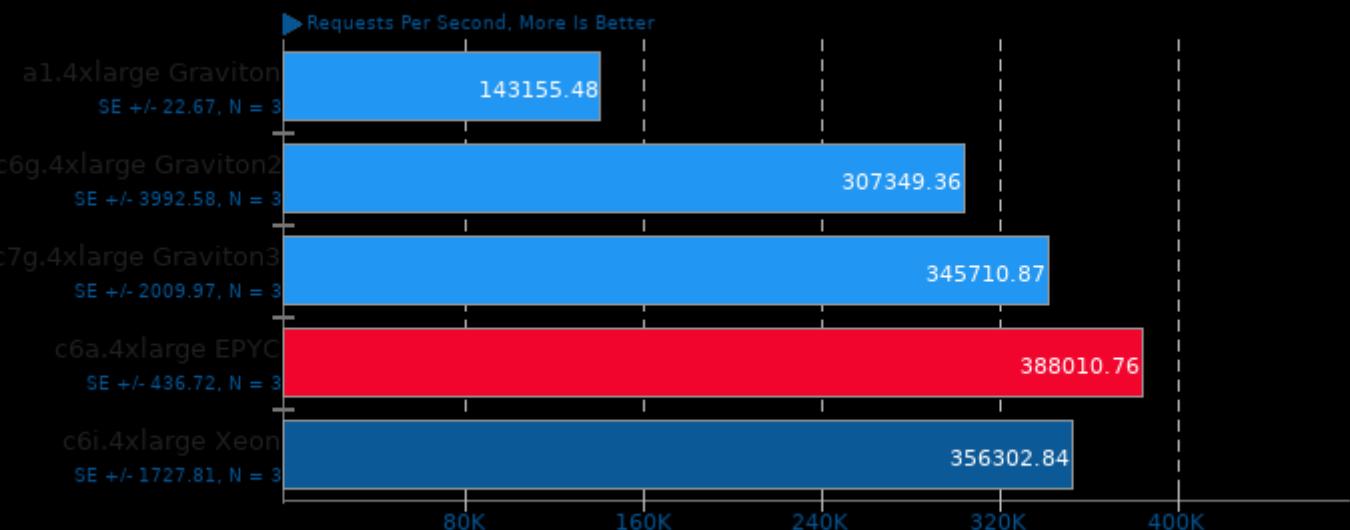
PyBench 2018-02-16

Total For Average Test Times



nginx 1.21.1

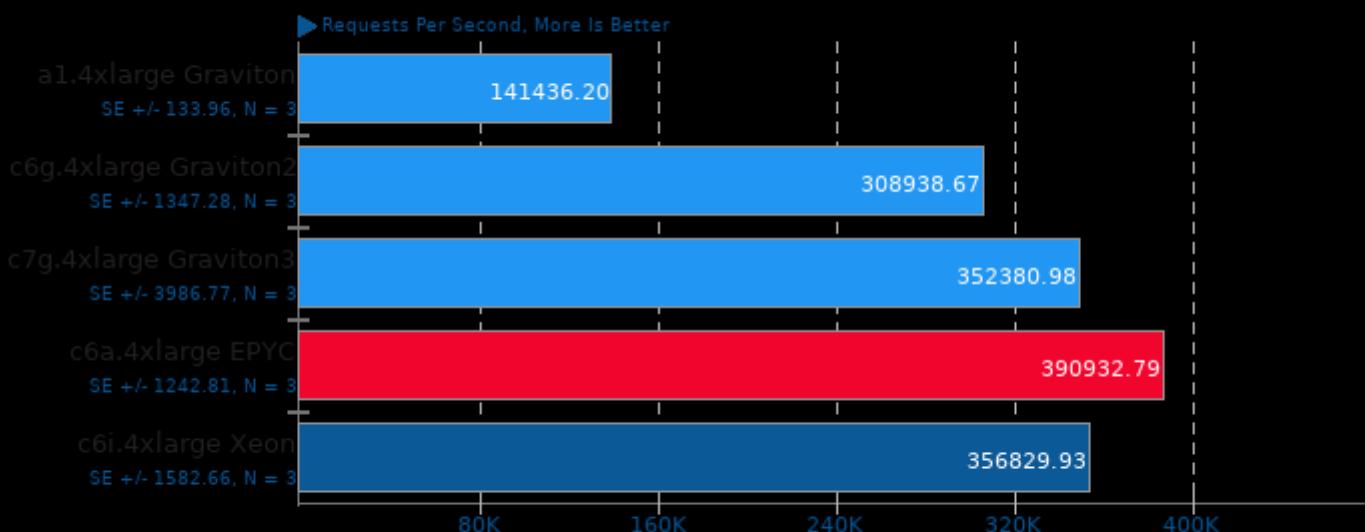
Concurrent Requests: 100



1. (CC) gcc options: -lcrypt -lz -O3 -march=native

nginx 1.21.1

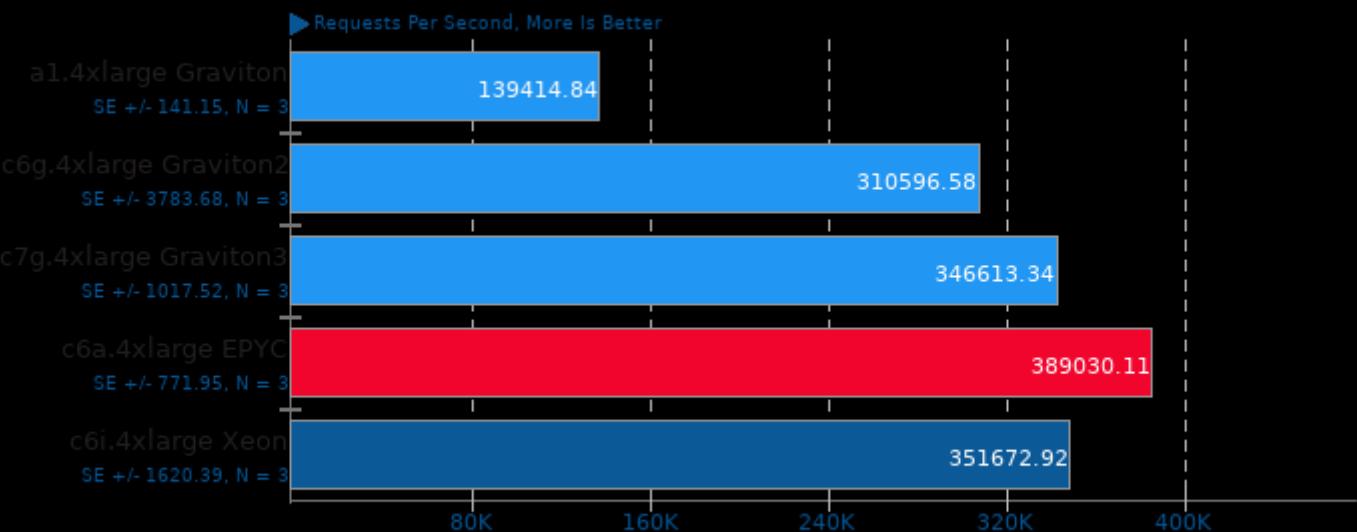
Concurrent Requests: 200



1. (CC) gcc options: -lcrypt -lz -O3 -march=native

nginx 1.21.1

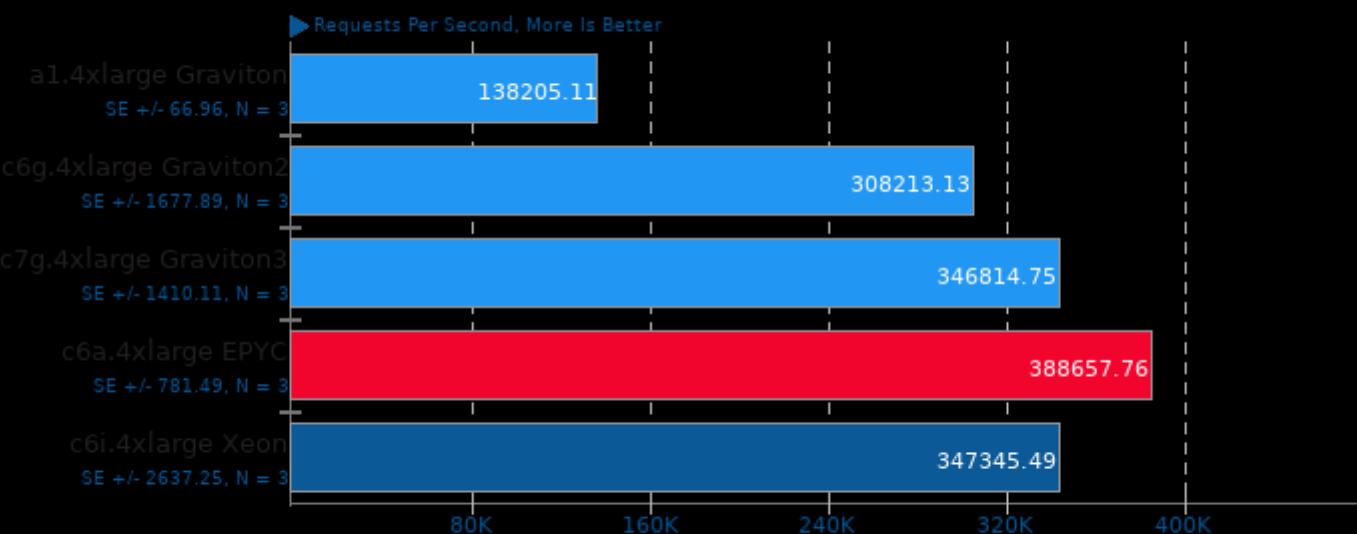
Concurrent Requests: 500



1. (CC) gcc options: -lcrypt -lz -O3 -march=native

nginx 1.21.1

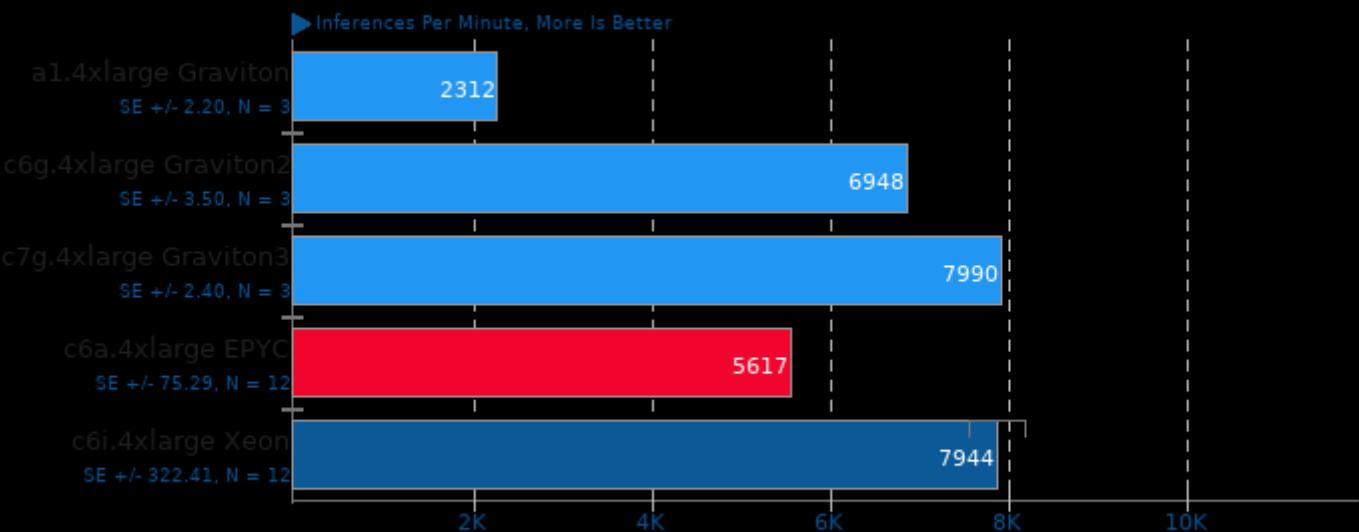
Concurrent Requests: 1000



1. (CC) gcc options: -lcrypt -lz -O3 -march=native

ONNX Runtime 1.11

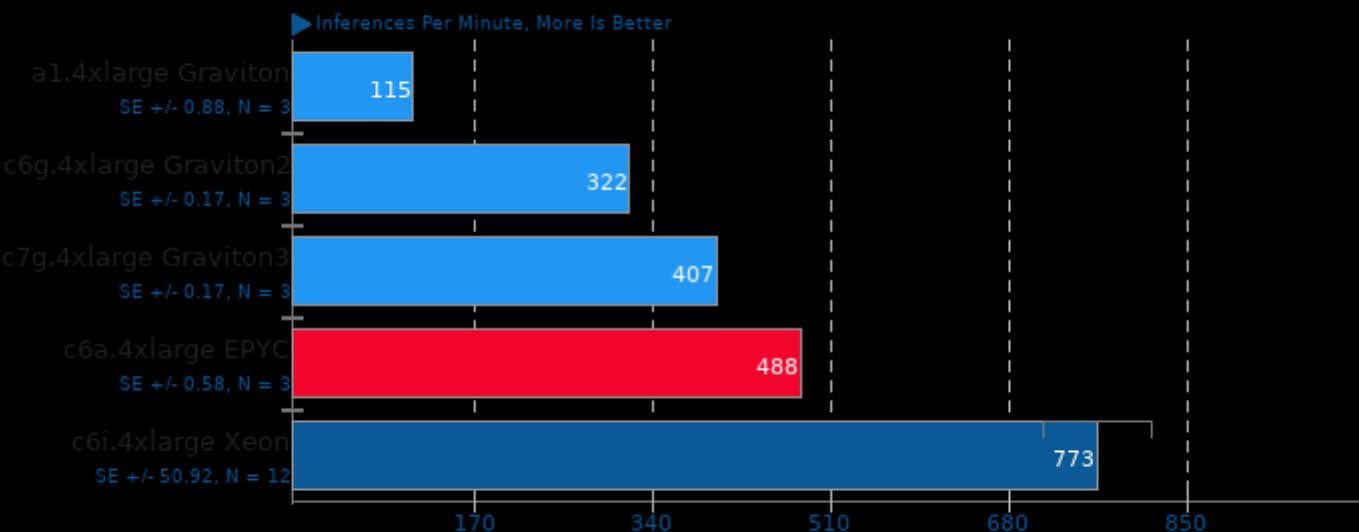
Model: GPT-2 - Device: CPU - Executor: Standard



1. (CXX) g++ options: -ffunction-sections -fdata-sections -march=native -mtune=native -O3 -fno-fat-lto-objects -ldl -lrt

ONNX Runtime 1.11

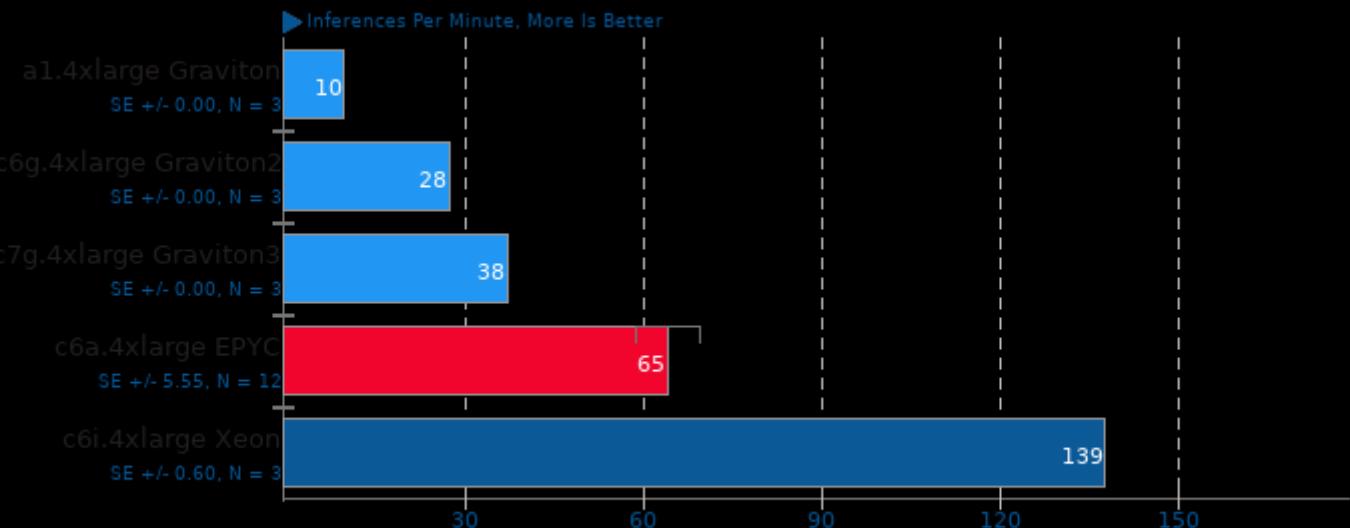
Model: bertsquad-12 - Device: CPU - Executor: Standard



1. (CXX) g++ options: -ffunction-sections -fdata-sections -march=native -mtune=native -O3 -fno-fat-lto-objects -ldl -lrt

ONNX Runtime 1.11

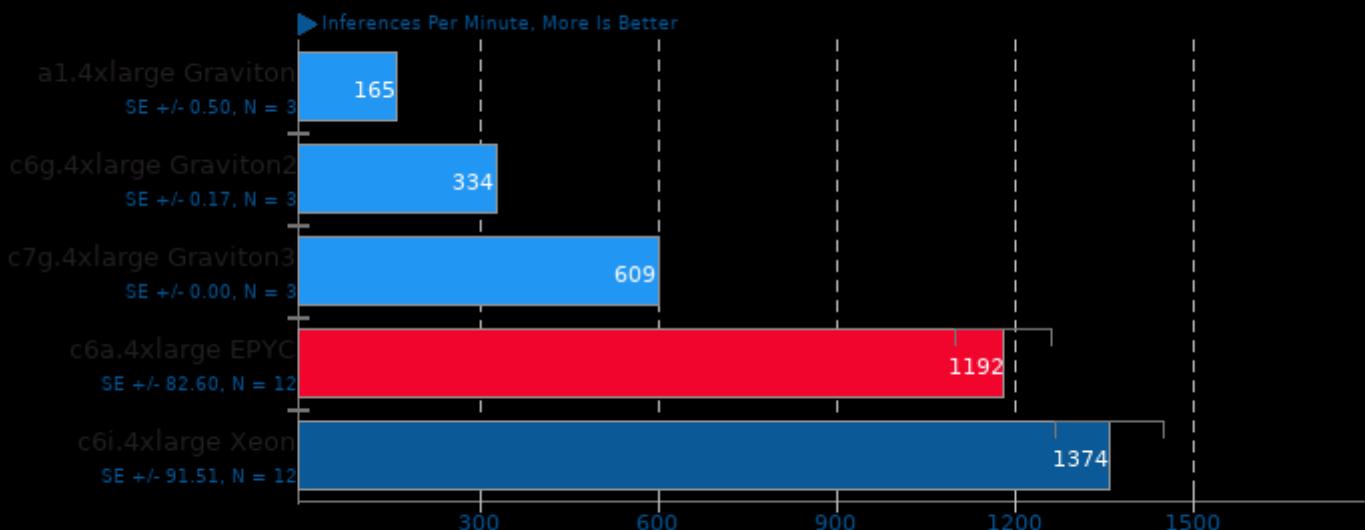
Model: fcn-resnet101-11 - Device: CPU - Executor: Standard



1. (CXX) g++ options: -ffunction-sections -fdata-sections -march=native -mtune=native -O3 -fno-fat-lto-objects -ldl -lrt

ONNX Runtime 1.11

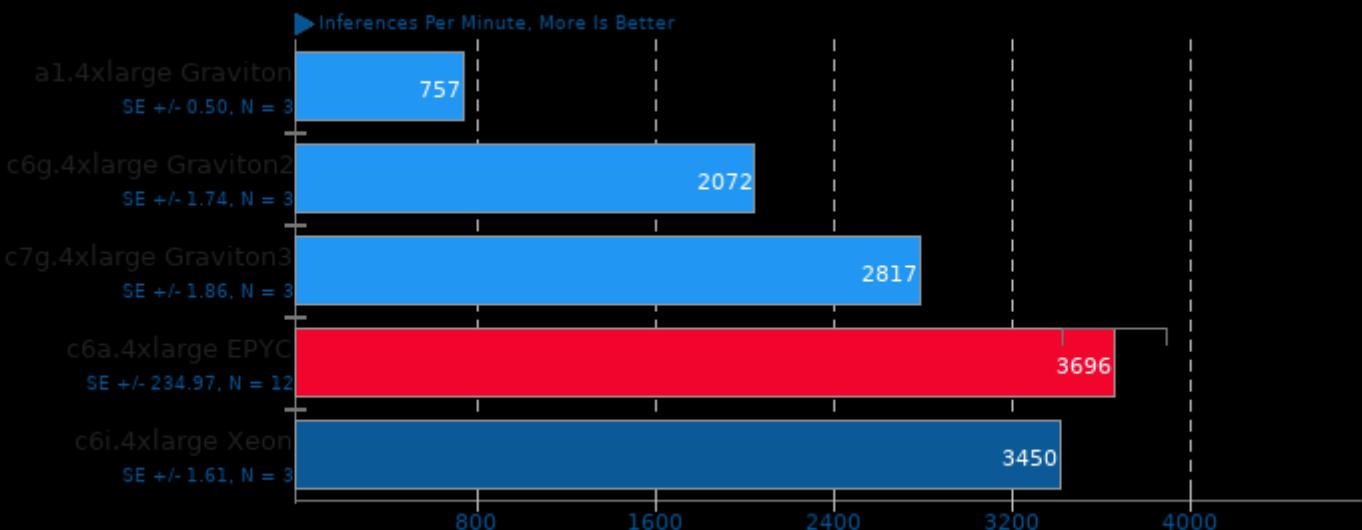
Model: ArcFace ResNet-100 - Device: CPU - Executor: Standard



1. (CXX) g++ options: -ffunction-sections -fdata-sections -march=native -mtune=native -O3 -fno-fat-lto-objects -ldl -lrt

ONNX Runtime 1.11

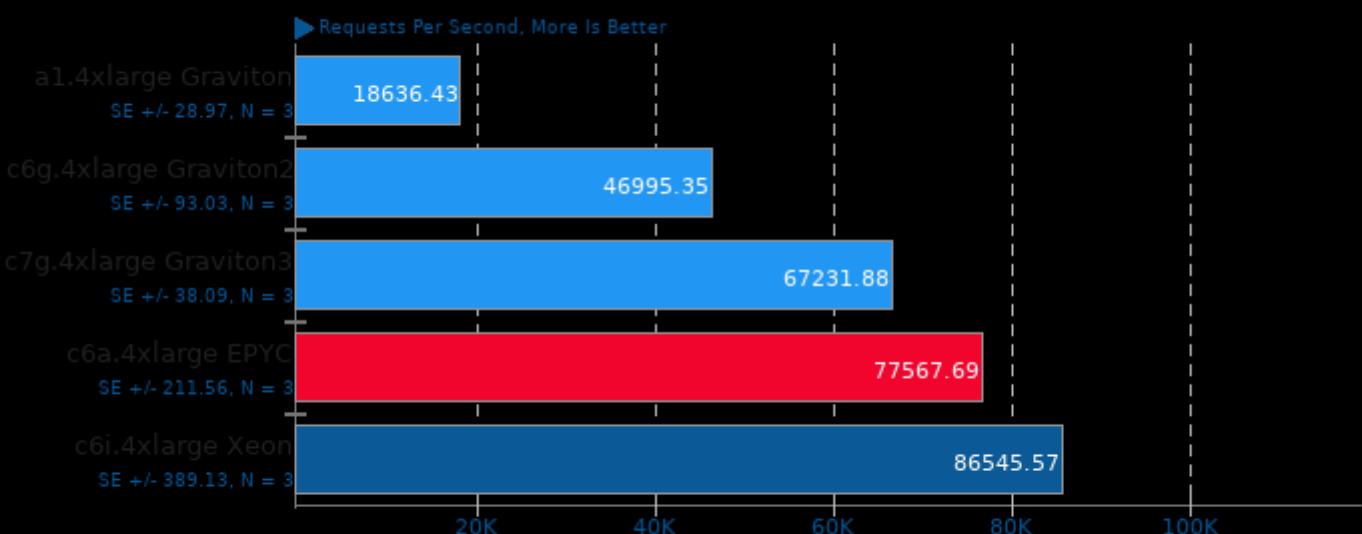
Model: super-resolution-10 - Device: CPU - Executor: Standard



1. (CXX) g++ options: -ffunction-sections -fdata-sections -march=native -mtune=native -O3 -fno-fat-lto-objects -ldl -lrt

Apache HTTP Server 2.4.48

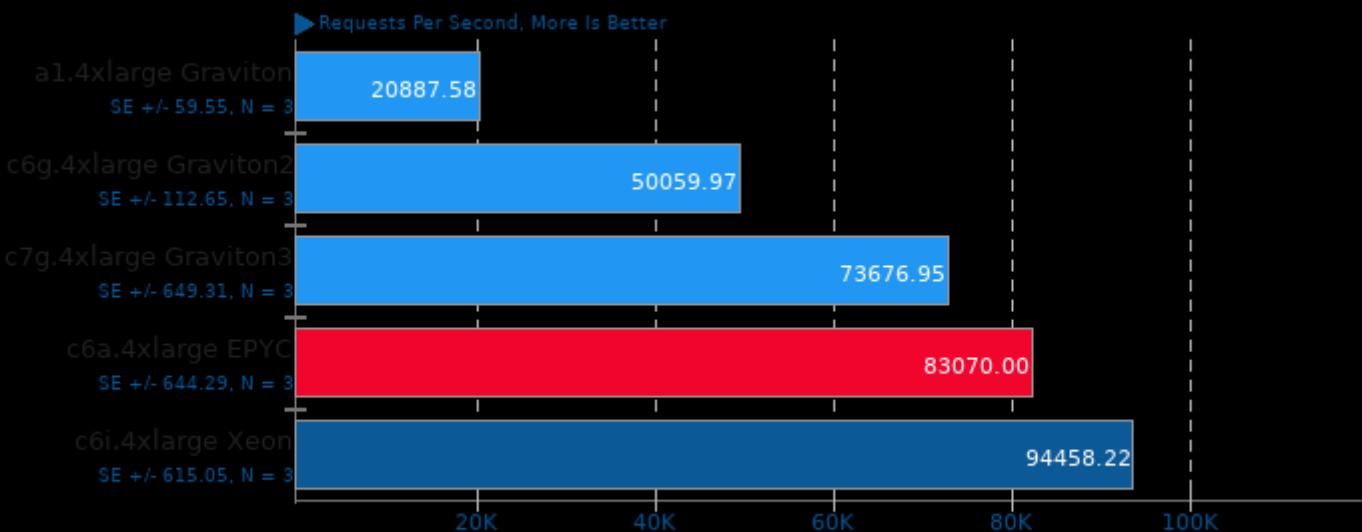
Concurrent Requests: 100



1. (CC) gcc options: -shared -fPIC -O2

Apache HTTP Server 2.4.48

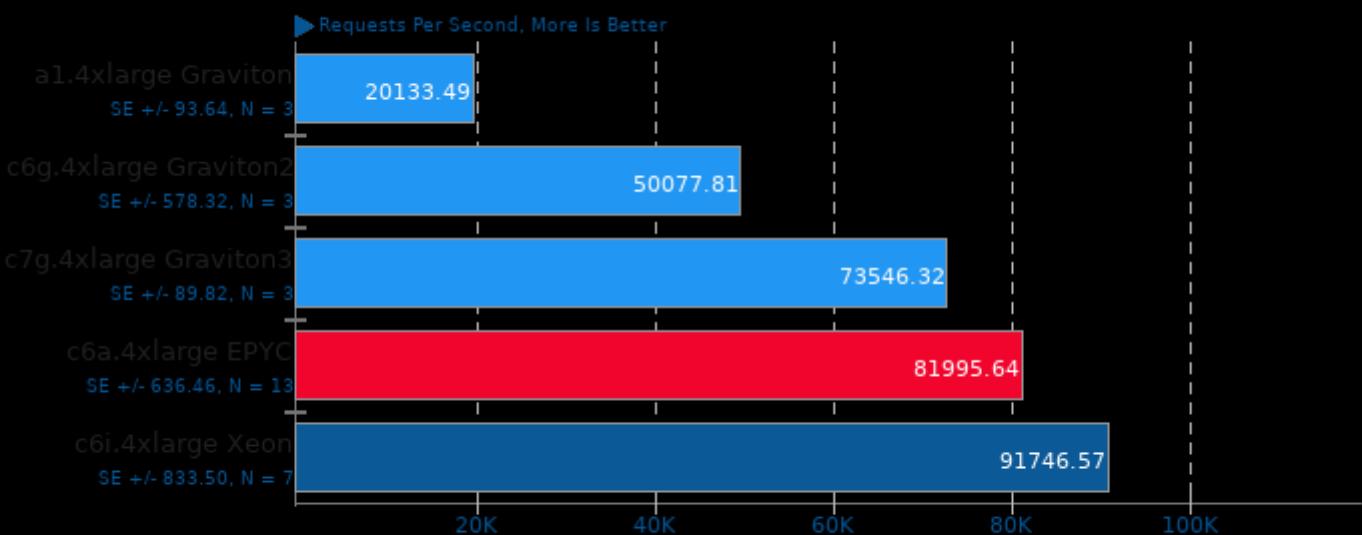
Concurrent Requests: 200



1. (CC) gcc options: -shared -fPIC -O2

Apache HTTP Server 2.4.48

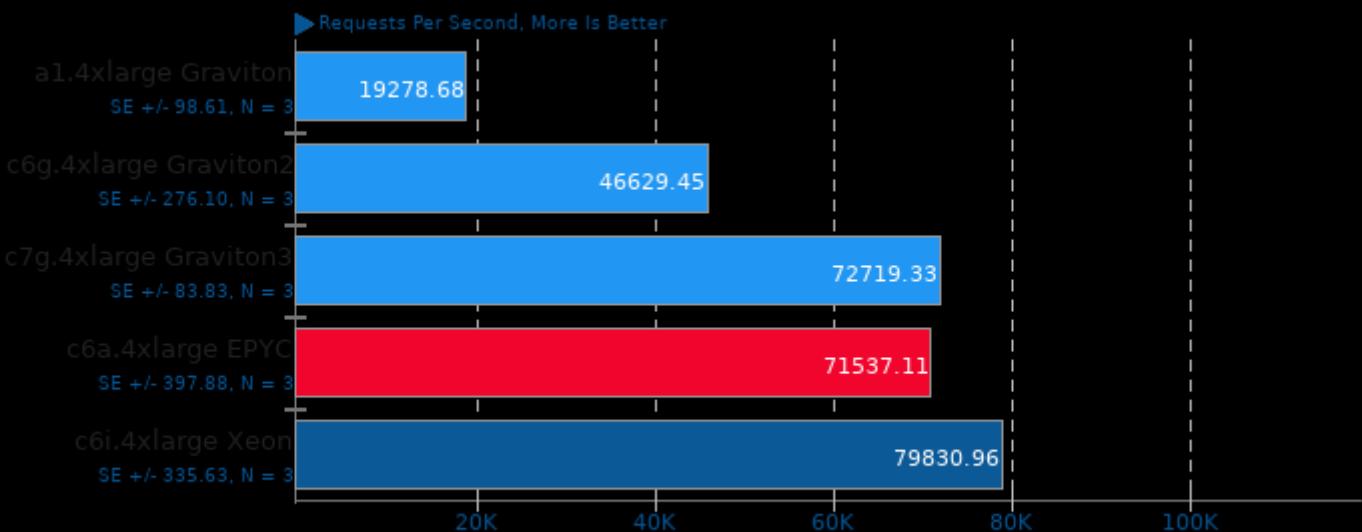
Concurrent Requests: 500



1. (CC) gcc options: -shared -fPIC -O2

Apache HTTP Server 2.4.48

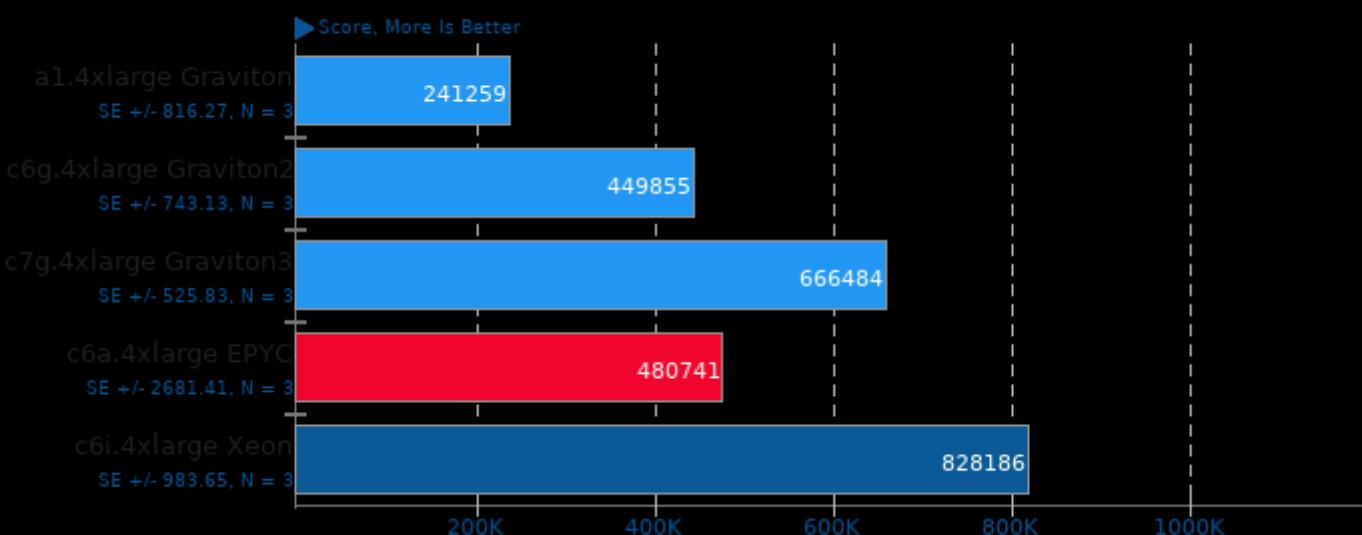
Concurrent Requests: 1000



1. (CC) gcc options: -shared -fPIC -O2

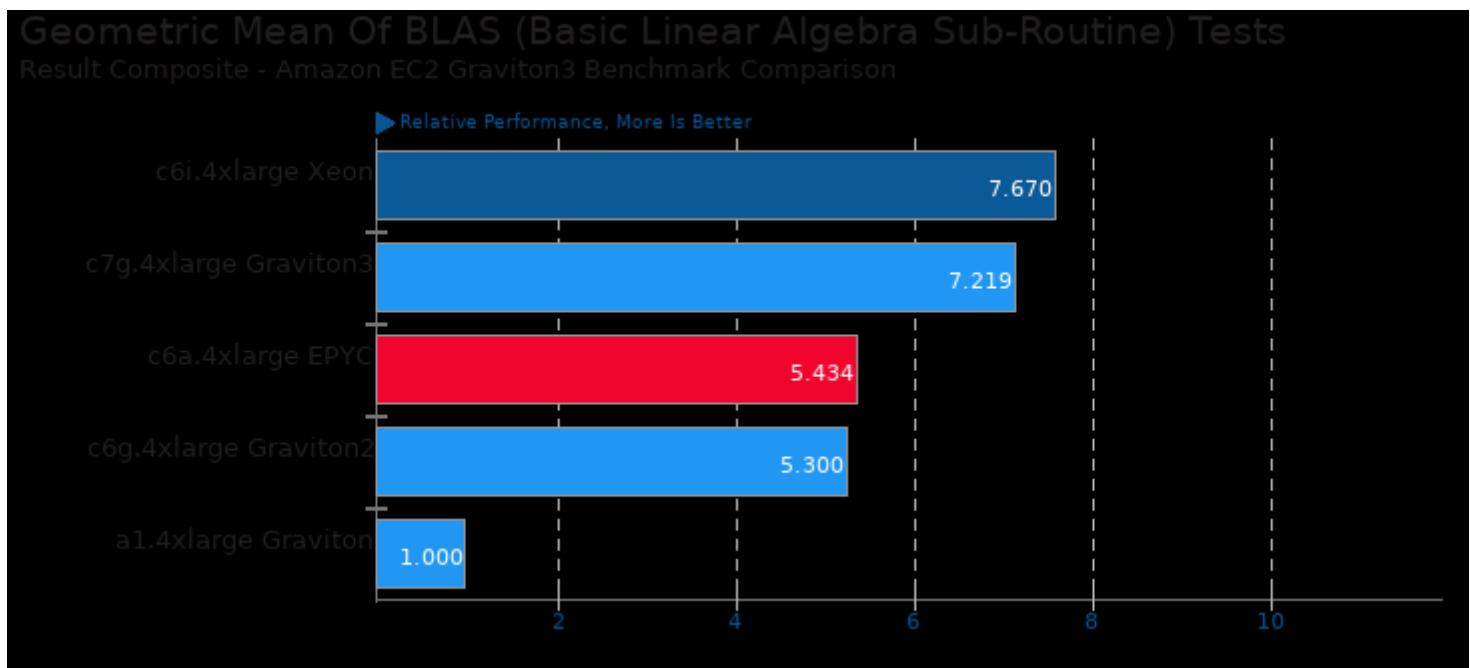
PHPBench 0.8.1

PHP Benchmark Suite

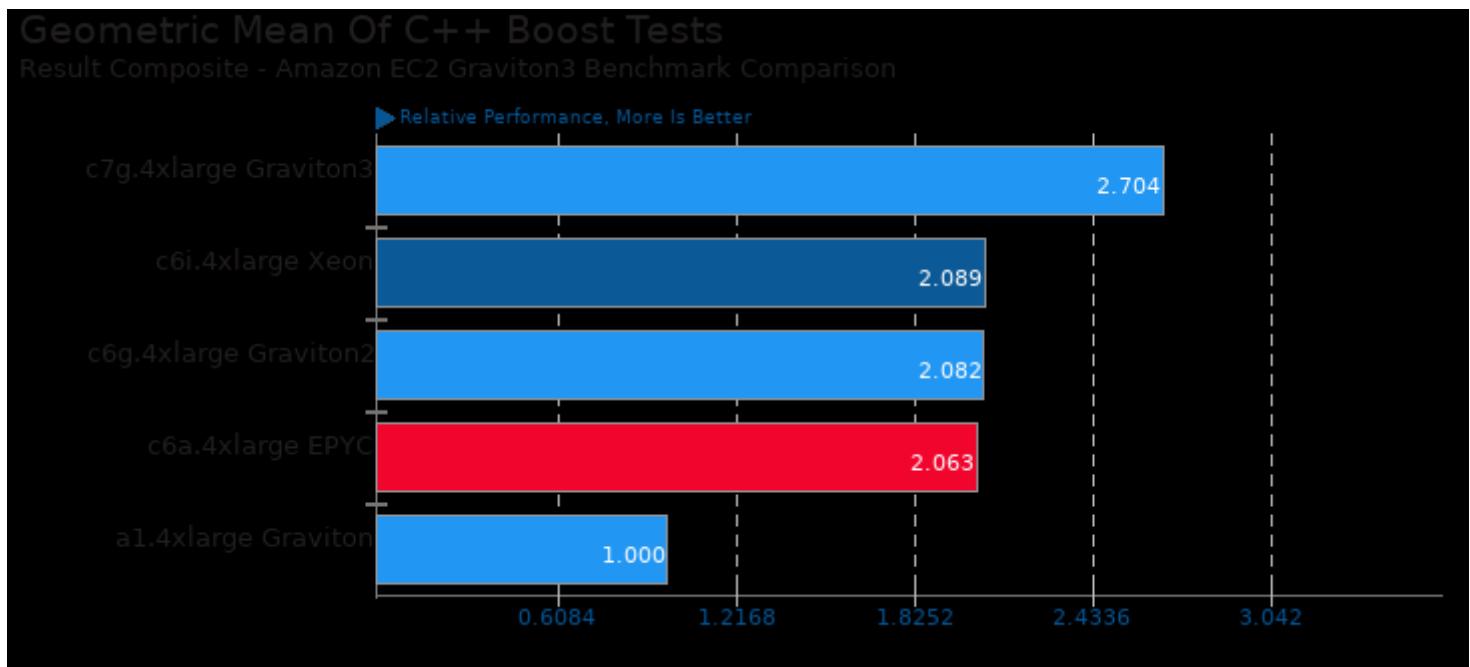


Amazon EC2 Graviton3 Benchmark Comparison

These geometric means are based upon test groupings / test suites for this result file.



Geometric mean based upon tests: pts/lczero and pts/gpaw

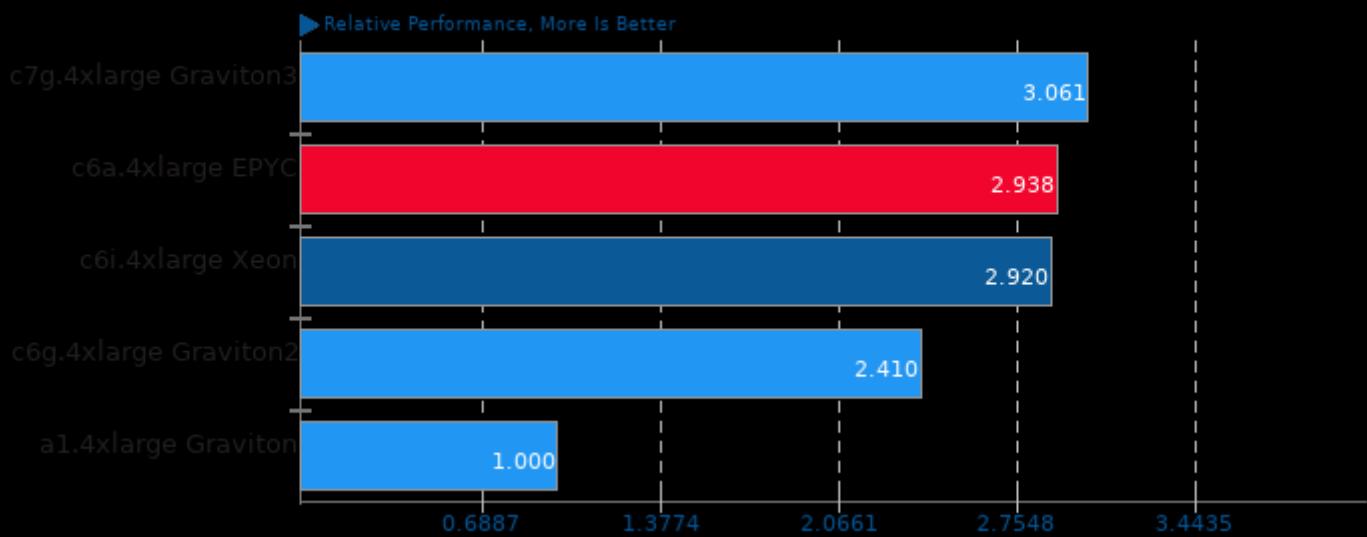


Geometric mean based upon tests: pts/build-gem5 and pts/povray

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of Chess Test Suite

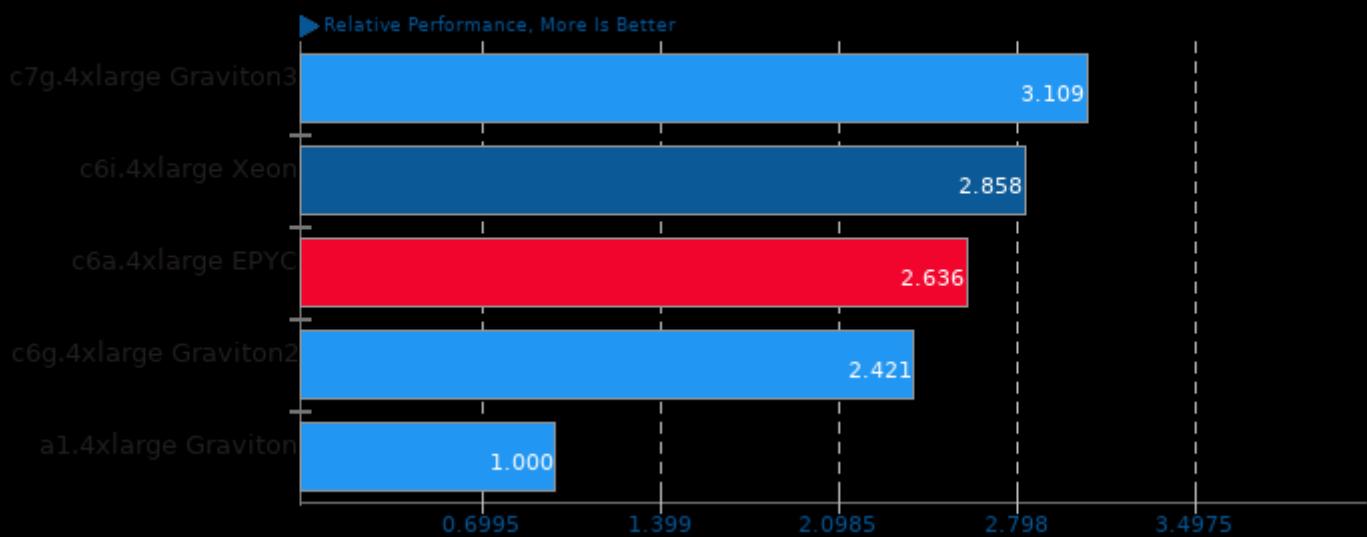
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/tscp, pts/lczero, pts/stockfish, pts/asmfish, pts/n-queens and pts/m-queens

Geometric Mean Of Timed Code Compilation Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison

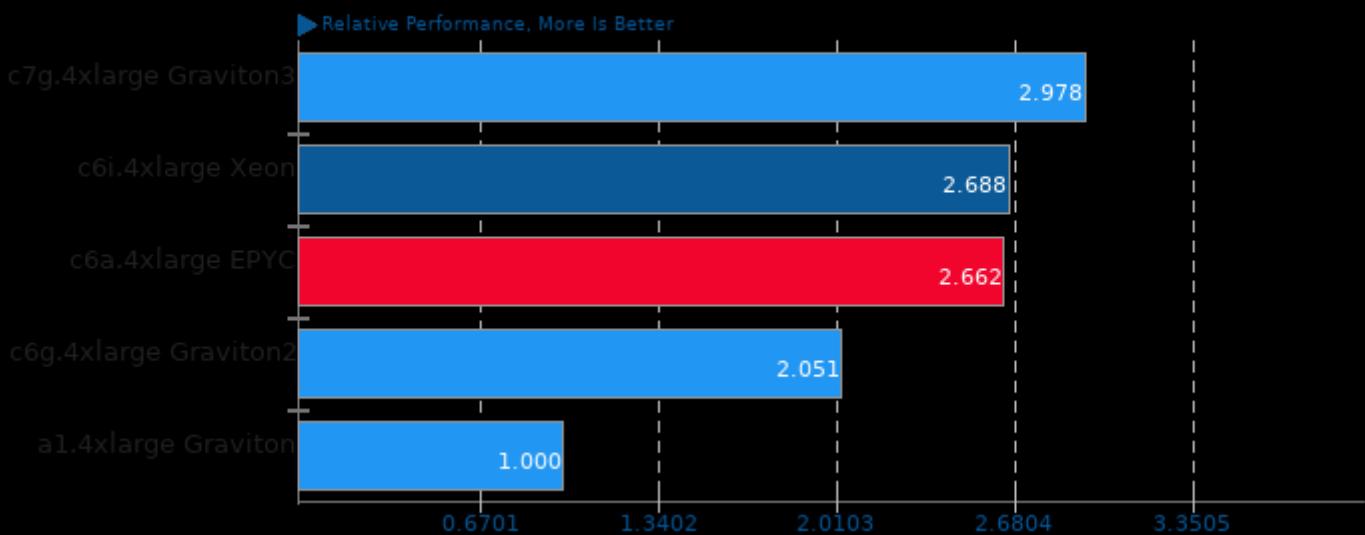


Geometric mean based upon tests: pts/build-apache, pts/build-php, pts/build-imagemagick, pts/build-llvm, pts/build2, pts/build-nodejs and pts/build-gem5

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of C/C++ Compiler Tests

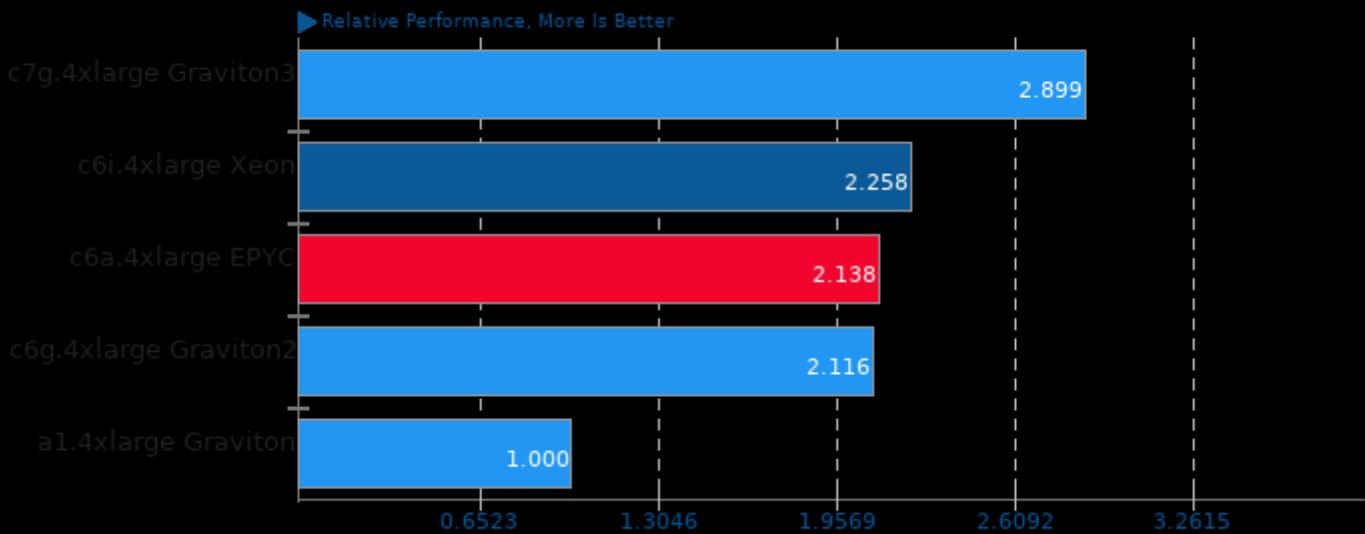
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/tscp, pts/stockfish, pts/build-php, pts/build-imagemagick, pts/build-llvm, pts/c-ray, pts/compress-7zip, pts/apache, pts/mrbayes, pts/compress-zstd, pts/openssl, pts/nginx, pts/lammps, pts/gromacs and pts/build-apache

Geometric Mean Of Compression Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison

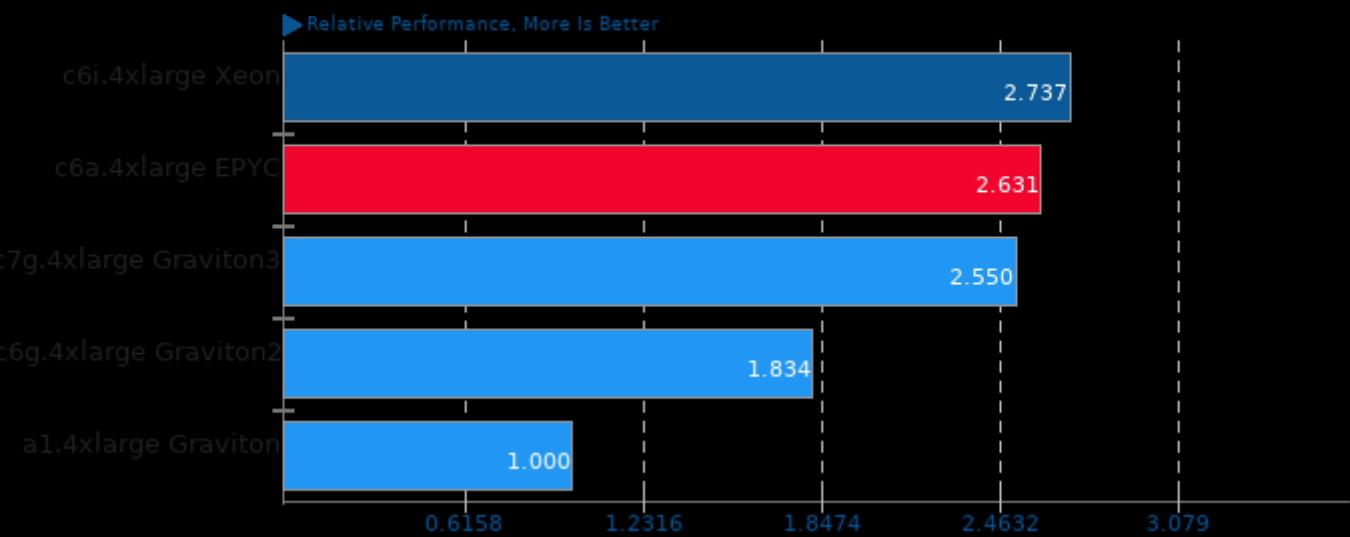


Geometric mean based upon tests: pts/compress-7zip and pts/compress-zstd

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of Creator Workloads Tests

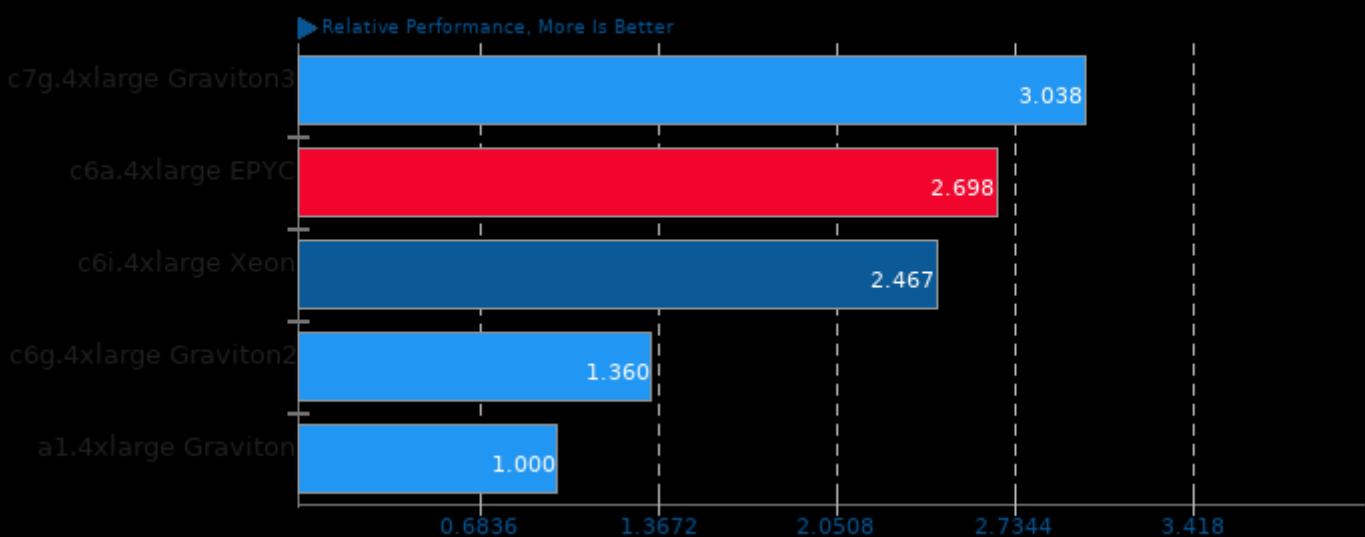
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/c-ray, pts/povray, pts/avifenc, pts/webp, pts/astcenc, pts/synthmark and pts/ngspice

Geometric Mean Of Cryptography Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison

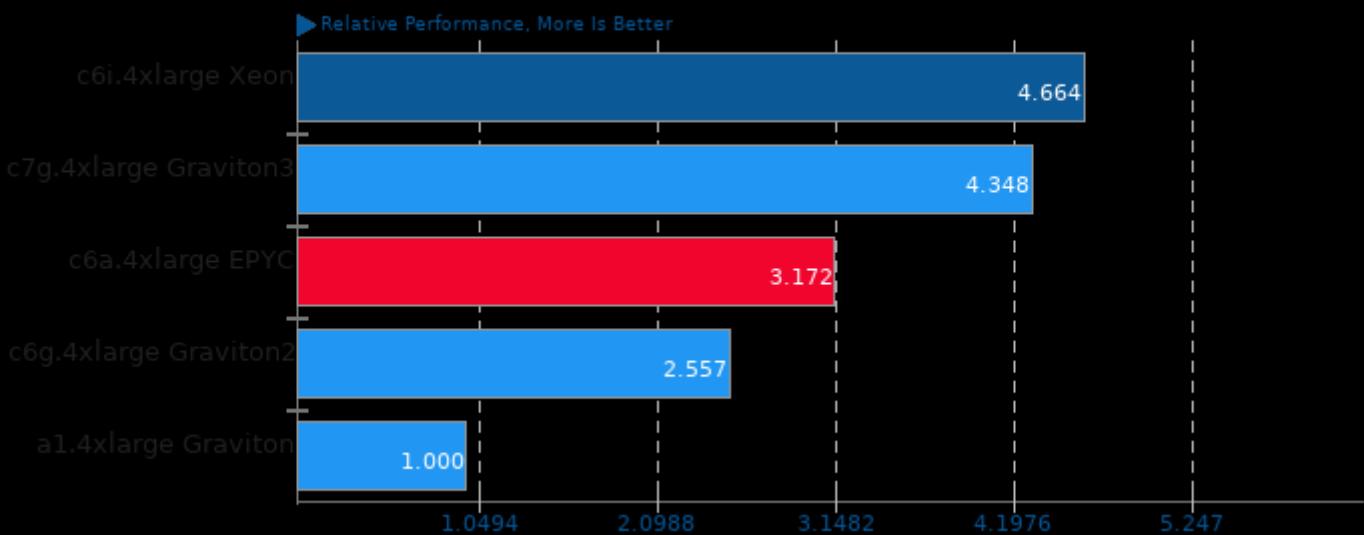


Geometric mean based upon tests: pts/openssl and pts/securemark

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of Fortran Tests

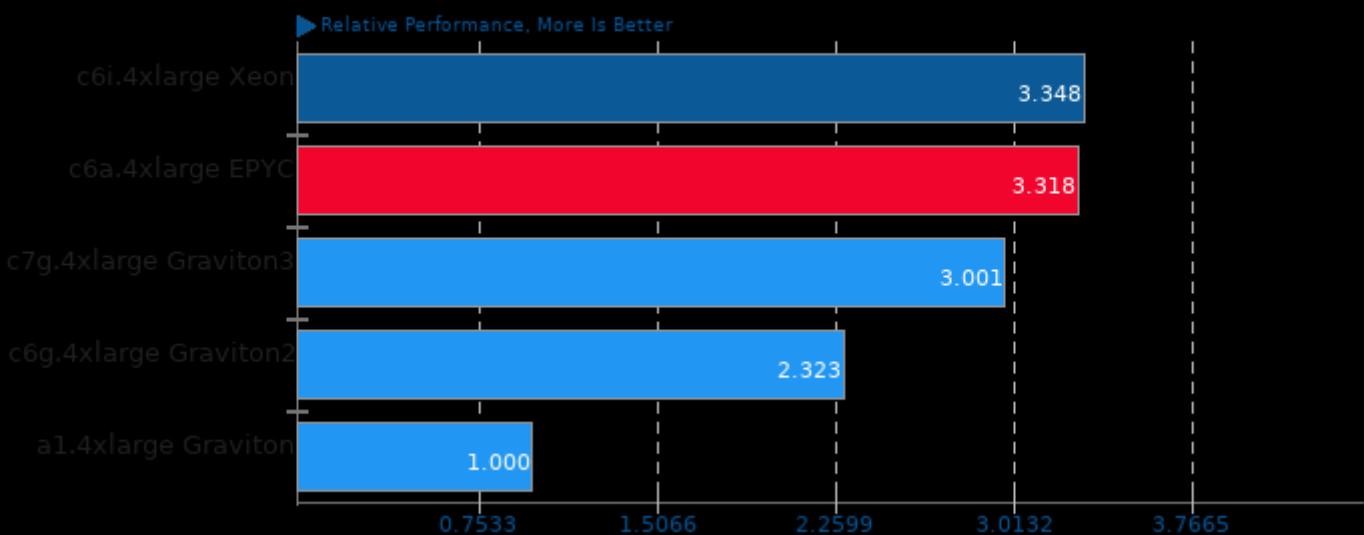
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/hpcg, pts/npb, pts/incompact3d and pts/lammps

Geometric Mean Of Go Language Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison

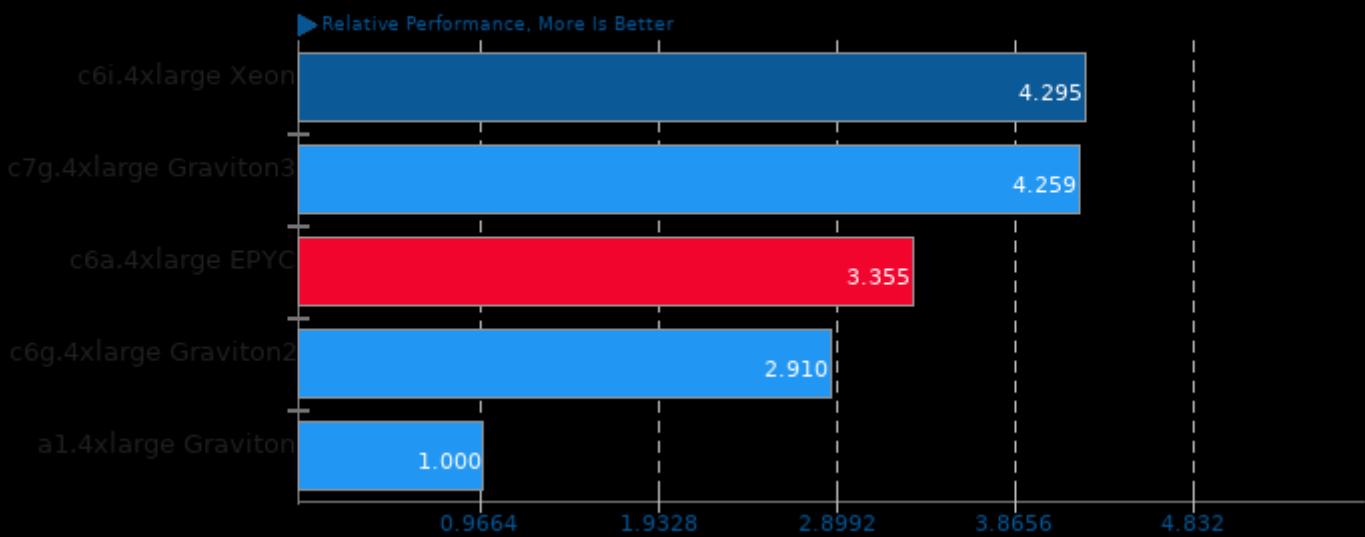


Geometric mean based upon tests: pts/nginx and pts/apache

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of HPC - High Performance Computing Tests

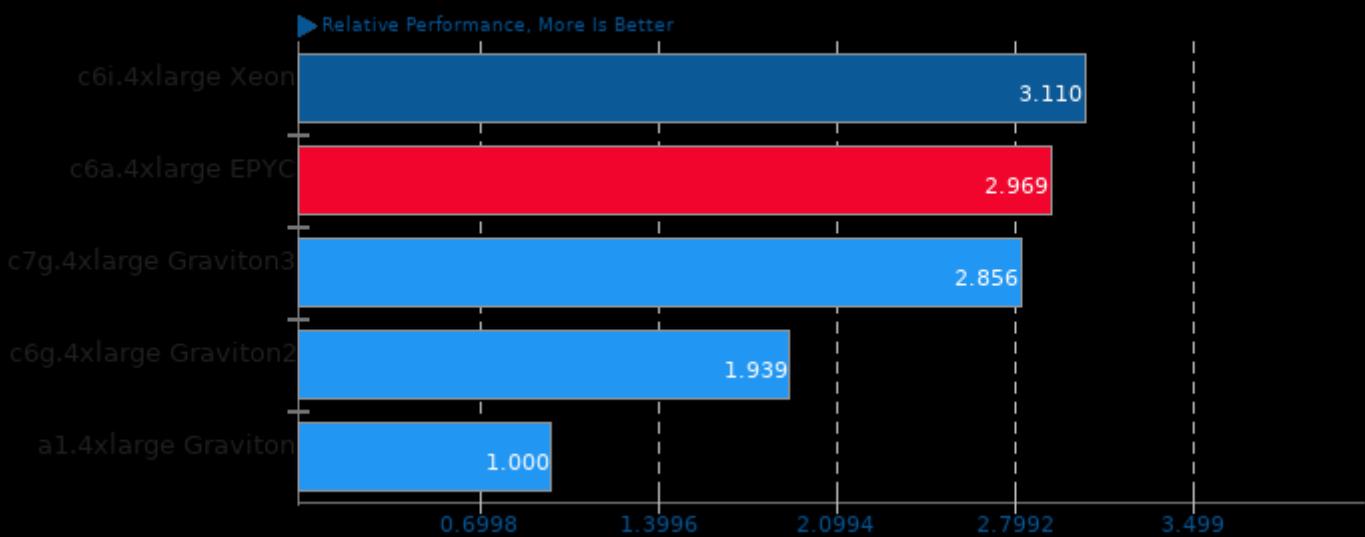
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/npb, pts/rodinia, pts/hpcg, pts/mt-dgemm, pts/amg, pts/gromacs, pts/lammps, pts/lulesh, pts/incompact3d, pts/mrbayes, pts/gpaw, pts/tensorflow-lite, pts/onnx and pts/lczero

Geometric Mean Of Imaging Tests

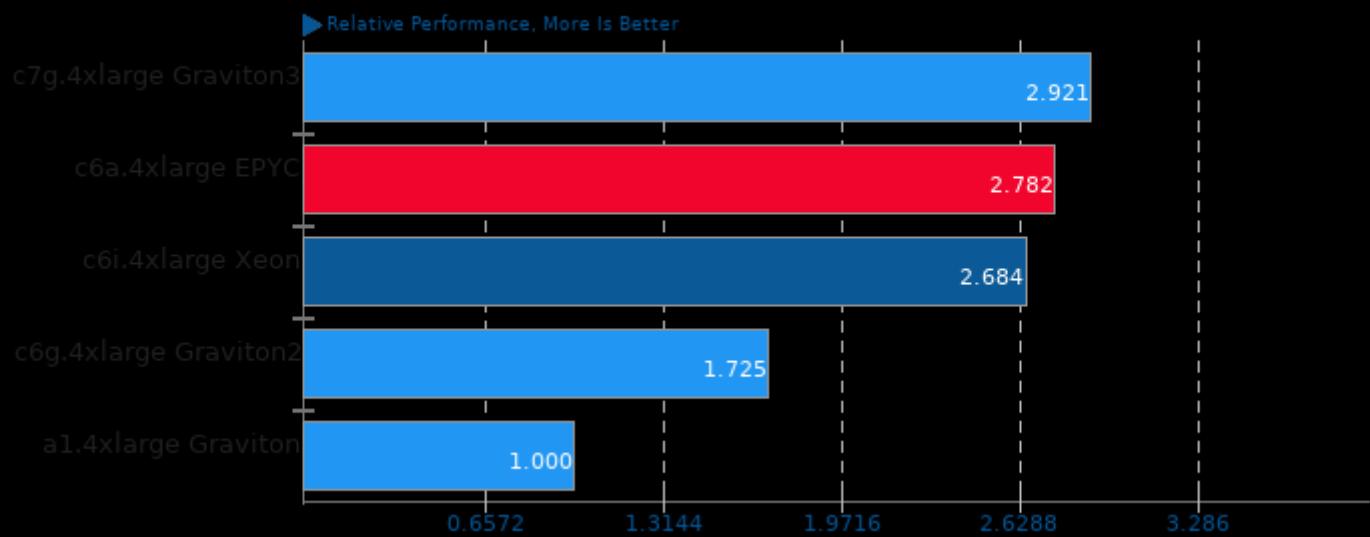
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/webp and pts/avifenc

Geometric Mean Of Common Kernel Benchmarks Tests

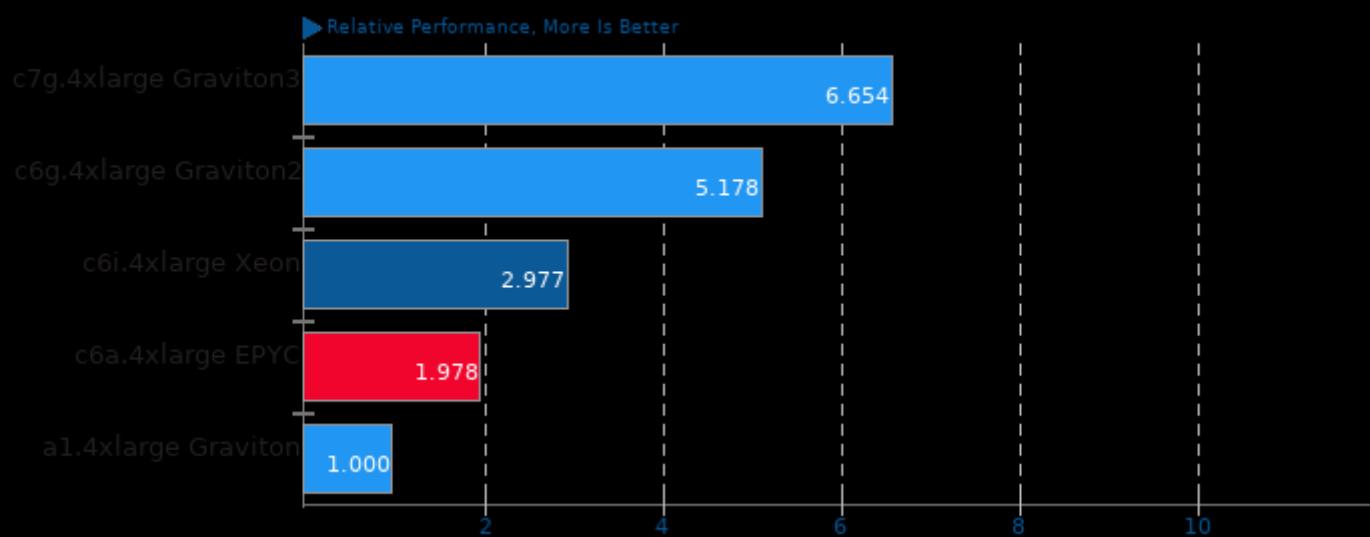
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/apache, pts/openssl and pts/stress-ng

Geometric Mean Of Linear Algebra Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison

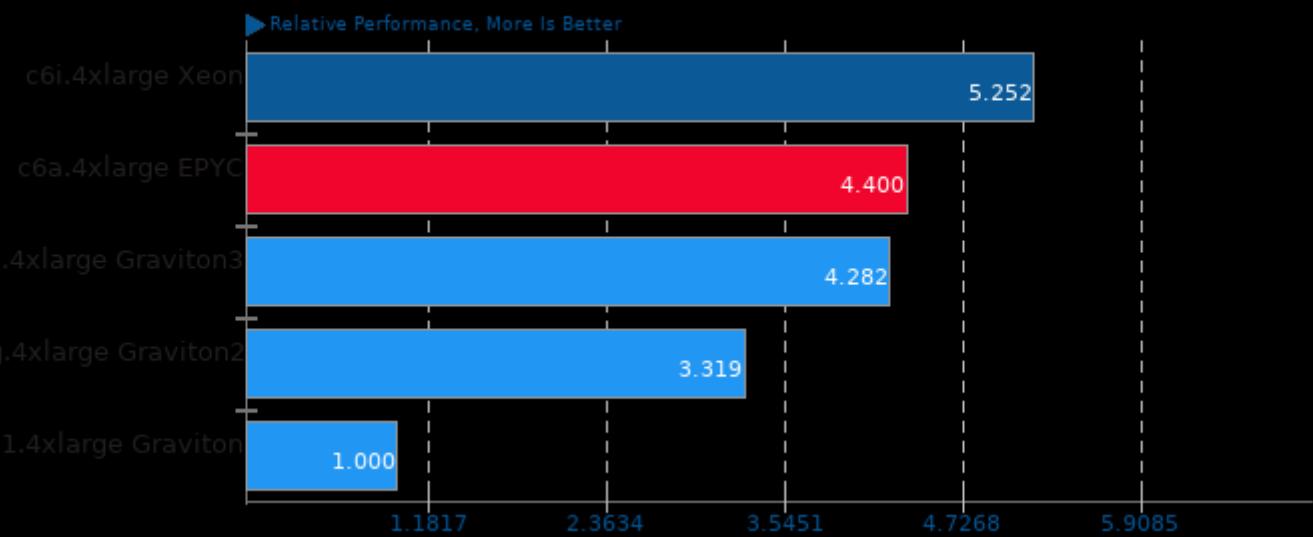


Geometric mean based upon tests: pts/mt-dgemm and pts/amg

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of Machine Learning Tests

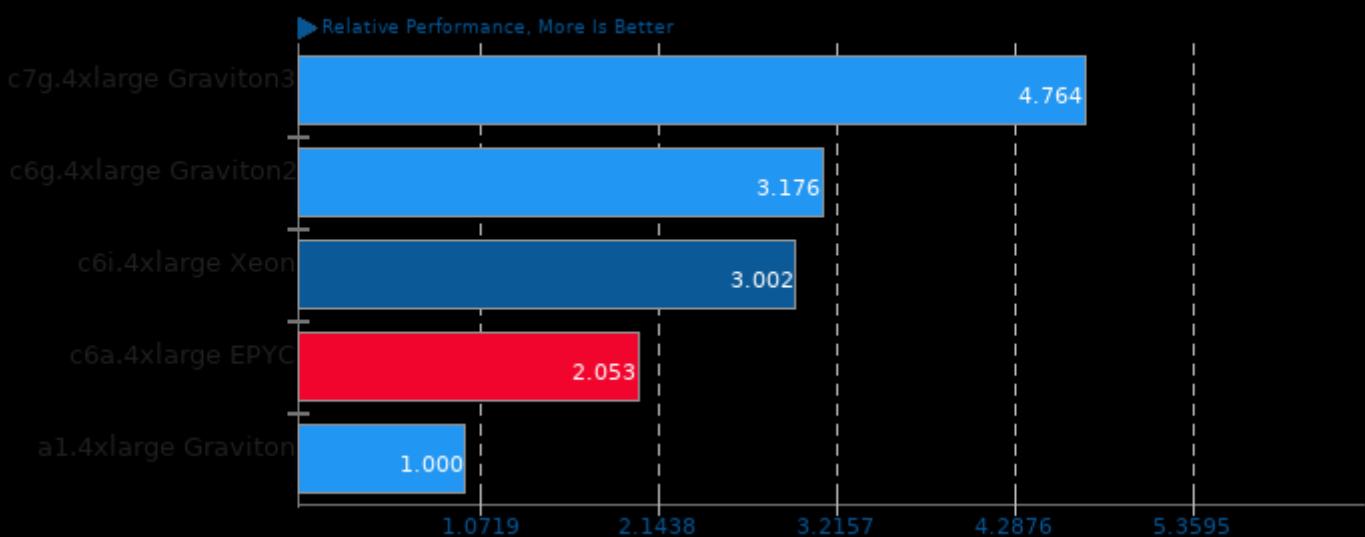
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/tensorflow-lite, pts/onnx and pts/lczero

Geometric Mean Of Molecular Dynamics Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison

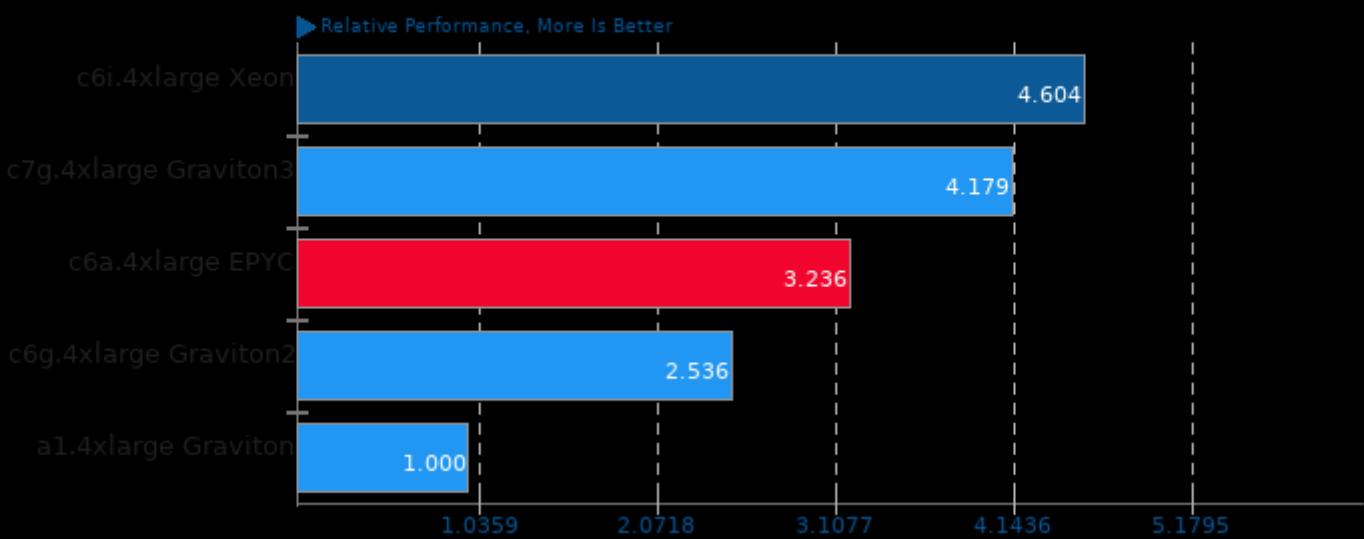


Geometric mean based upon tests: pts/gromacs, pts/lammps, pts/lulesh and pts/incompact3d

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of MPI Benchmarks Tests

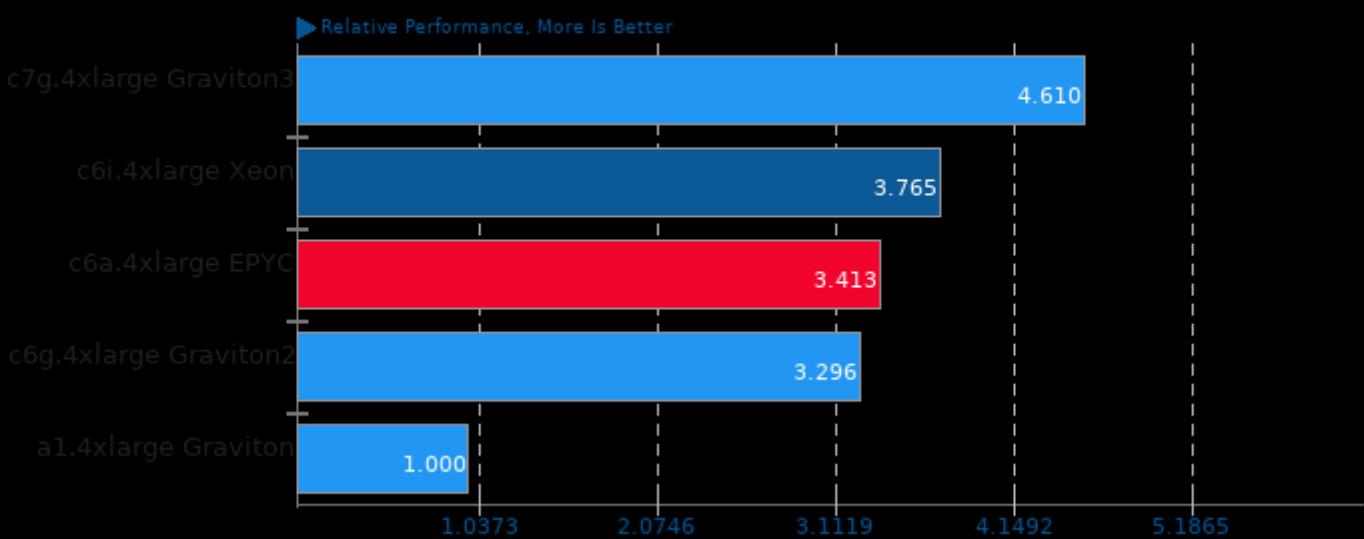
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/lammps, pts/incompact3d, pts/gpaw, pts/gromacs, pts/hpcg, pts/mrbayes and pts/npb

Geometric Mean Of NVIDIA GPU Compute Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison

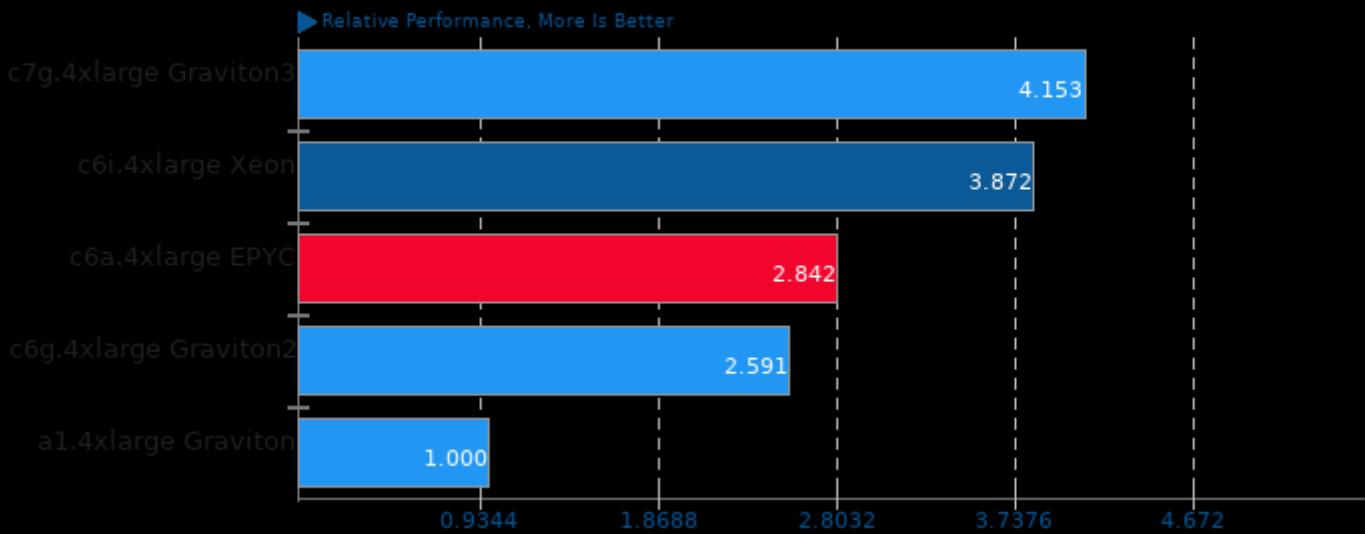


Geometric mean based upon tests: pts/gromacs, pts/rodinia and pts/lczero

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of OpenMPI Tests

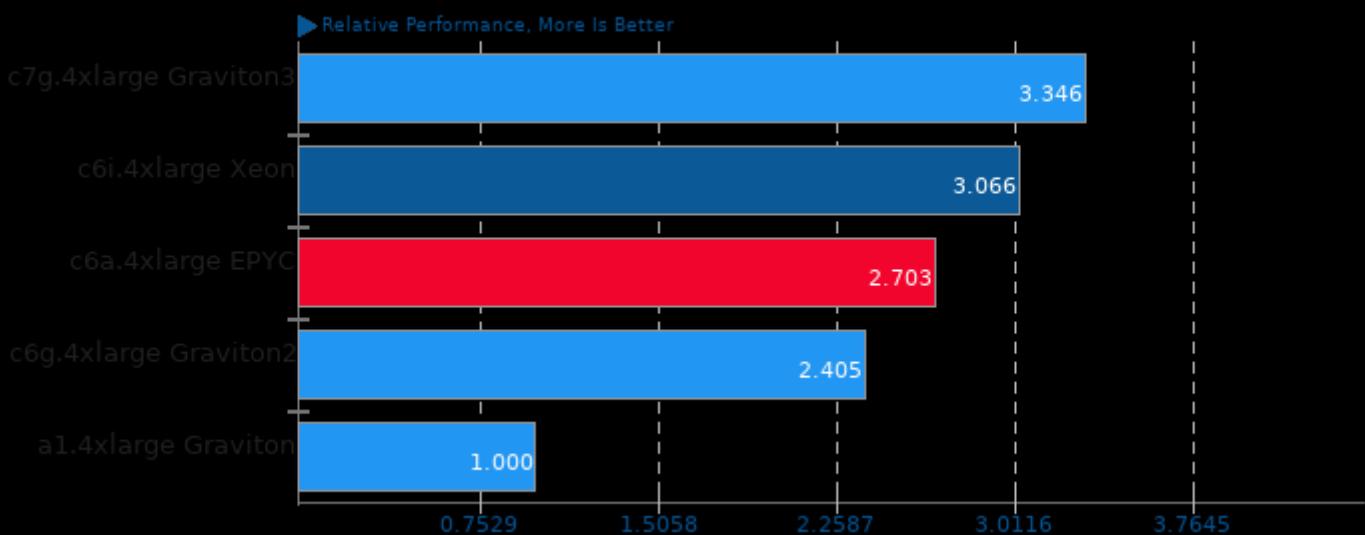
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/hpcg, pts/npb, pts/rodinia, pts/amg, pts/mrbayes, pts/incompact3d, pts/lammps, pts/lulesh, pts/gromacs and pts/gpaw

Geometric Mean Of Programmer / Developer System Benchmarks Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison

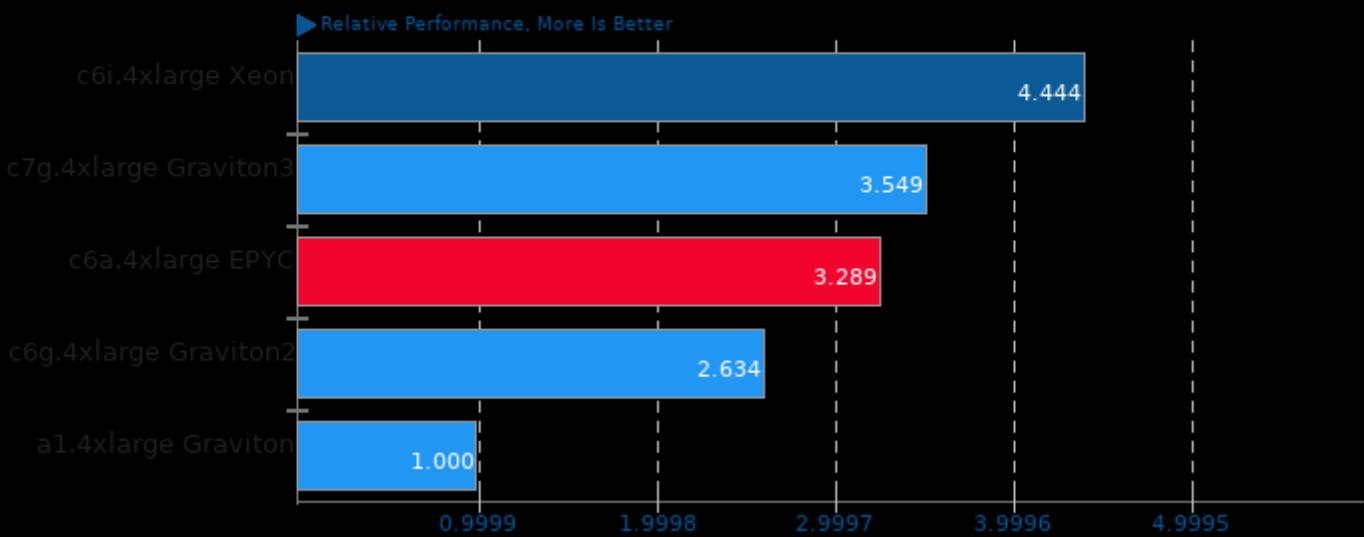


Geometric mean based upon tests: pts/simdjson, pts/compress-zstd, pts/pybench, pts/build-apache, pts/build-php, pts/build-imagemagick, pts/build-llvm, pts/build2, pts/build-nodejs, pts/build-gem5, pts/mt-dgemm and pts/amg

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of Python Tests

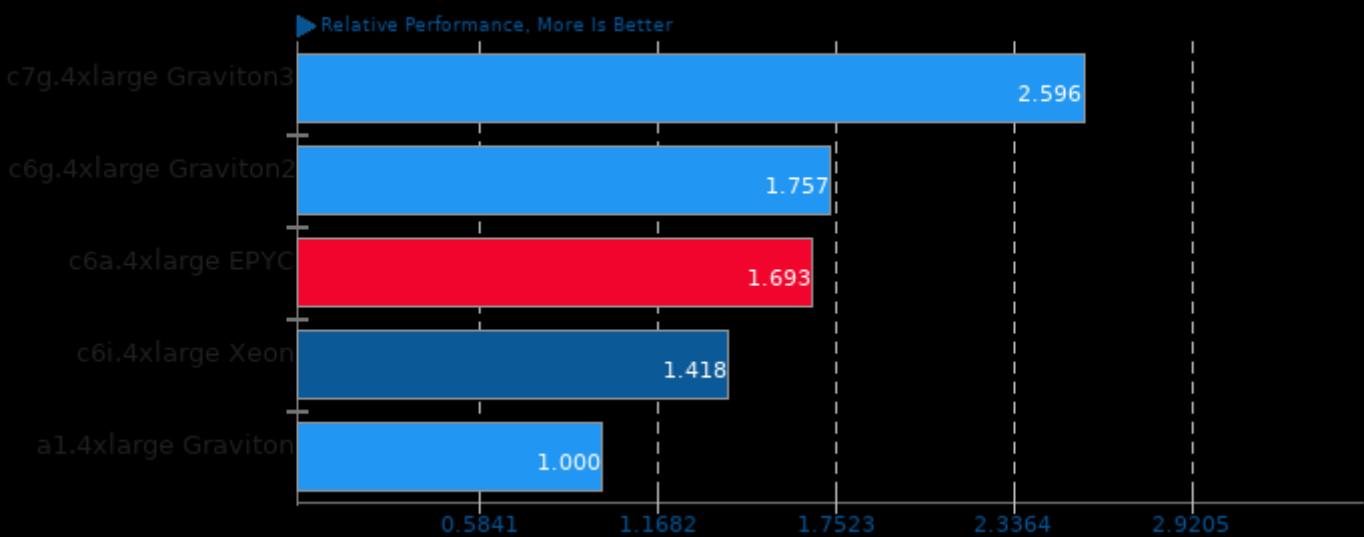
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/build-gem5, pts/build-llvm, pts/build-nodejs, pts/gpaw, pts/pybench and pts/onnx

Geometric Mean Of Raytracing Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison

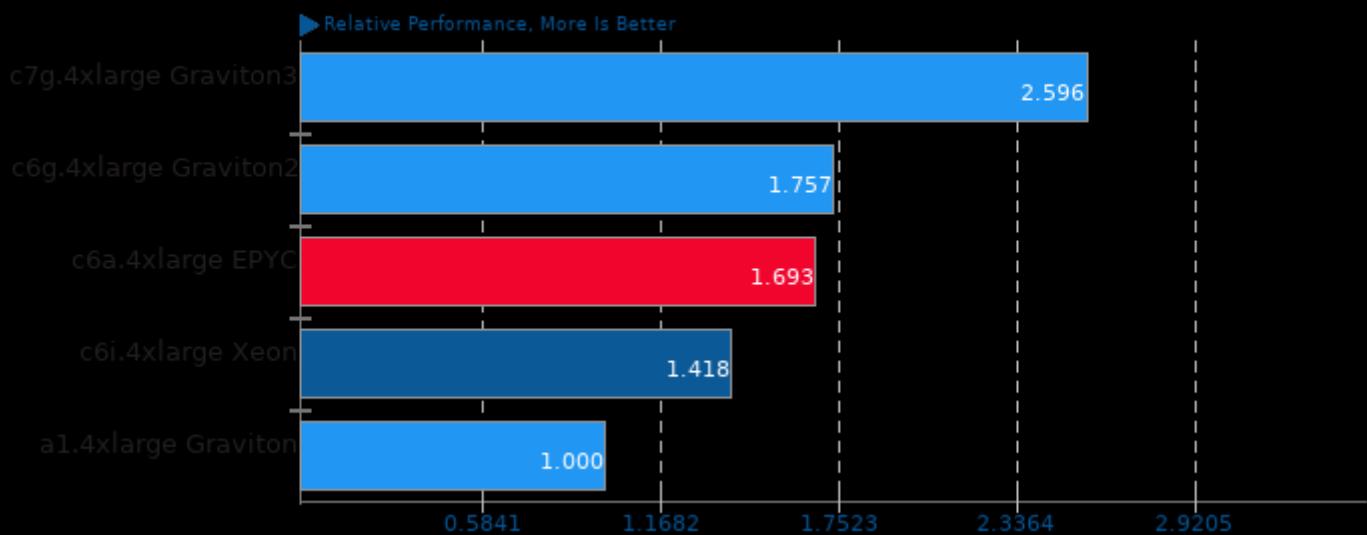


Geometric mean based upon tests: pts/c-ray and pts/povray

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of Renderers Tests

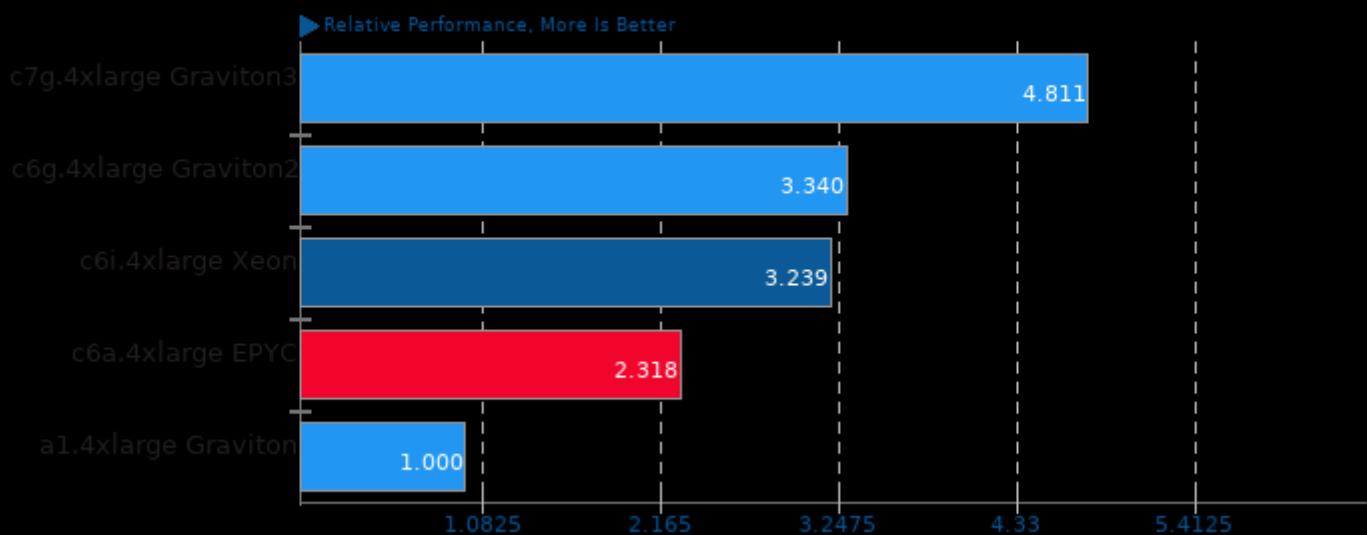
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/c-ray and pts/povray

Geometric Mean Of Scientific Computing Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison

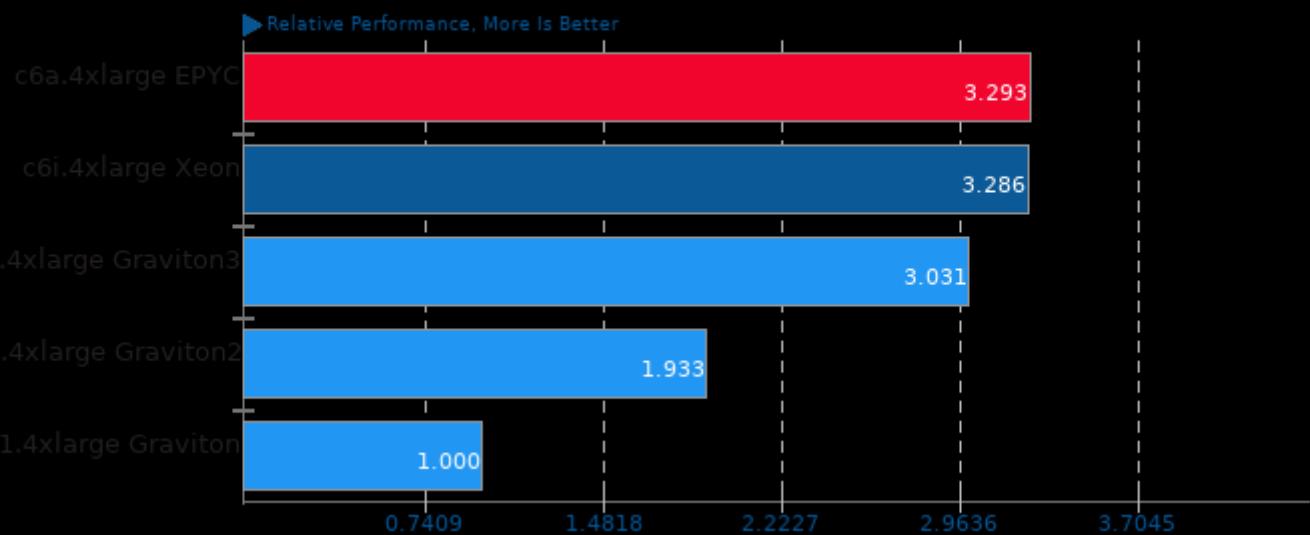


Geometric mean based upon tests: pts/mt-dgemm, pts/amg, pts/gromacs, pts/lammps, pts/lulesh, pts/incompact3d, pts/mrbayes and pts/gpaw

Amazon EC2 Graviton3 Benchmark Comparison

Geometric Mean Of Server Tests

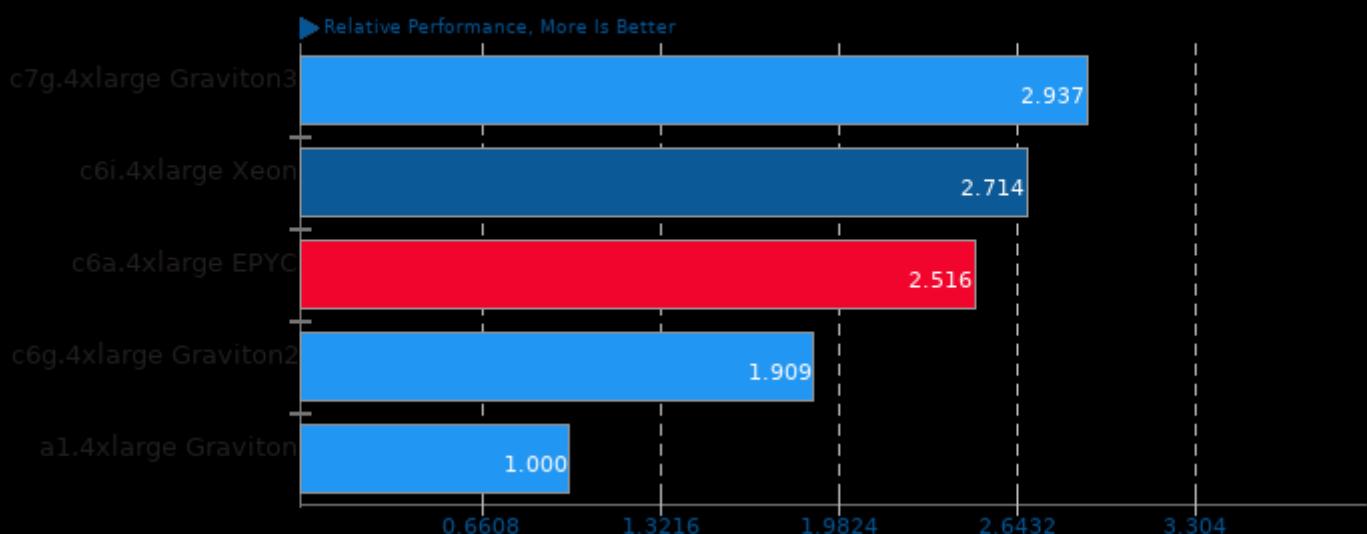
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/apache, pts/nginx, pts/phpbench, pts/openssl and pts/simdjson

Geometric Mean Of Server CPU Tests

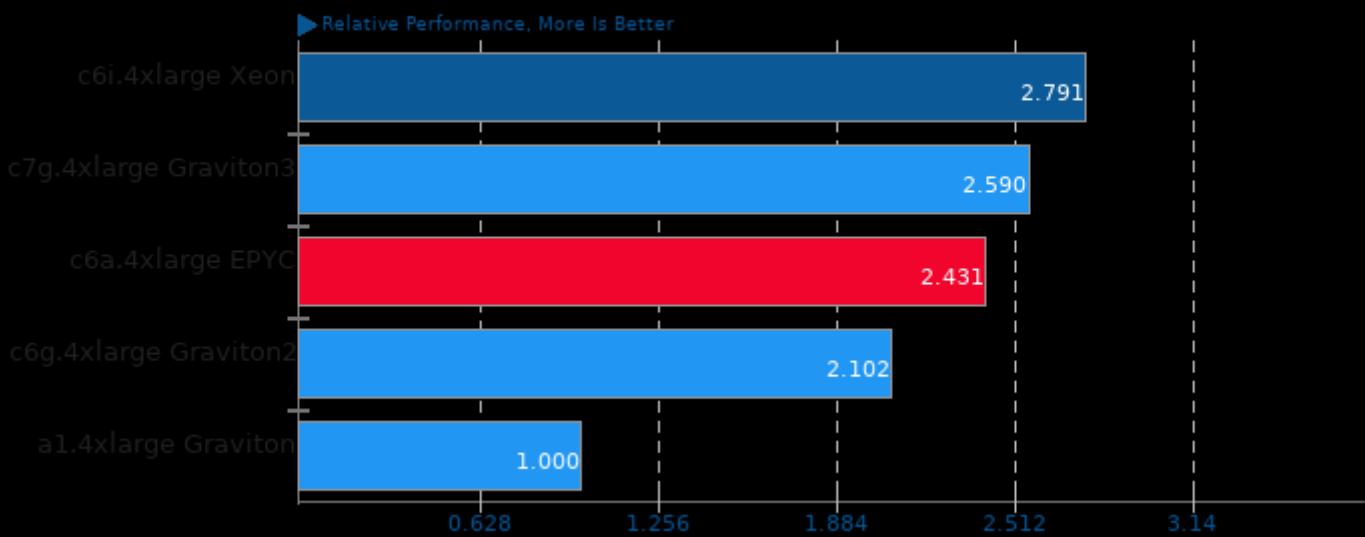
Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/npb, pts/rodinia, pts/dacapobench, pts/compress-7zip, pts/stockfish, pts/asmfish, pts/build-php, pts/build-llvm, pts/c-ray, pts/povray, pts/compress-zstd, pts/m-queens, pts/openssl, pts/stress-ng, pts/pybench and pts/phpbench

Geometric Mean Of Single-Threaded Tests

Result Composite - Amazon EC2 Graviton3 Benchmark Comparison



Geometric mean based upon tests: pts/pybench, pts/phpbench and pts/nginx

This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 09:48.