



Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test

Ampere Altra Q80-30 testing with GIGABYTE E252-P30 and 16 x 16GB DDR4-3200 (1DPC) on Ubuntu 21.10 via the Phoronix Test Suite by ServerNews.ru (<https://servernews.ru/1056763/>)

Automated Executive Summary

2 x AMD EPYC 7543 had the most wins, coming in first place for 38% of the tests.

Based on the geometric mean of all complete results, the fastest (2 x Intel Xeon Platinum 8368) was 1.702x the speed of the slowest (1 x Ampere Altra Q80-30). 2 x AMD EPYC 7543 was 0.896x the speed of 2 x Intel Xeon Platinum 8368, 2 x AMD EPYC 7763 was 0.973x the speed of 2 x AMD EPYC 7543, 2 x Intel Xeon Platinum 8260M was 0.883x the speed of 2 x AMD EPYC 7763, 1 x Ampere Altra Q80-30 was 0.763x the speed of 2 x Intel Xeon Platinum 8260M.

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

*oneDNN (Harness: Deconvolution Batch shapes_1d - Data Type: u8s8f32 - Engine: CPU) at 266.681x
oneDNN (Harness: Deconvolution Batch shapes_1d - Data Type: f32 - Engine: CPU) at 31.697x
oneDNN (Harness: Convolution Batch Shapes Auto - Data Type: f32 - Engine: CPU) at 16.703x
oneDNN (Harness: Recurrent Neural Network Training - Data Type: bf16bf16bf16 - Engine: CPU) at 9.515x
OpenSSL (RSA 4096-bit Performance) at 6.726x
Sysbench (Test: CPU) at 6.325x
Kvazaar (Video Input: Bosphorus 1080p - Video Preset: Medium) at 4.699x*

CacheBench (Test: Read) at 4.399x

MariaDB (Clients: 128) at 4.016x

Timed Linux Kernel Compilation (Time To Compile) at 3.784x.

Test Systems:

2 x AMD EPYC 7763

Processor: 2 x AMD EPYC 7763 64-Core @ 2.45GHz (128 Cores / 256 Threads), Motherboard: AMD DAYTONA_X (RYM1001D BIOS), Chipset: AMD Starship/Matisse, Memory: 1008GB, Disk: 3201GB HUSMR7632BDP3M1 + 256GB Micron 1100 MTFD, Graphics: ASPEED, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.10, Kernel: 5.8.0-44-generic (x86_64), Compiler: GCC 10.2.0, File-System: xfs, Screen Resolution: 1024x768

Kernel Notes: Transparent Huge Pages: madvise

```
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --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-multithread --enable-multilib --enable-nls --enable-objc-gc=auto
--enable-offload-targets=nvptx-none=/build/gcc-10-JwvWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgc-nv-amdhsa=/build/gcc-10-JwvWM/gcc-10-10.2.0/debian/tmp-gcn/us
r,hsa --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-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: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa001119

Processors Notes: Scaling: 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: always-on RSB filling + srbsds: Not affected + tsx_async_abort: Not affected

2 x AMD EPYC 7543

Processor: 2 x AMD EPYC 7543 32-Core @ 2.80GHz (64 Cores / 128 Threads), Motherboard: AMD DAYTONA_X (RYM1001D BIOS), Chipset: AMD Starship/Matisse, Memory: 504GB, Disk: 3201GB HUSMR7632BDP3M1 + 256GB Micron 1100 MTFD, Graphics: ASPEED, Network: 2 x Mellanox MT27710

OS: Ubuntu 20.10, Kernel: 5.8.0-44-generic (x86_64), Compiler: GCC 10.2.0, File-System: xfs, Screen Resolution: 1024x768

Kernel Notes: Transparent Huge Pages: madvise

```
Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --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-multithread --enable-multiarch --enable-nls --enable-objc-gc=auto
--enable-offload-targets=nvptx-none=/build/gcc-10-JwvpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgc-nv-amdhsa=/build/gcc-10-JwvpWM/gcc-10-10.2.0/debian/tmp-gcn/us
r,hsa --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-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
```

Disk Notes: NONE / attr2,inode64,logbsize=32k,logbufs=8,noquota,relatime,rw / Block Size: 4096

Processor Notes: Scaling Governor: acpi-cpufreq performance (Boost: Enabled) - CPU Microcode: 0xa0011119

Java Notes: OpenJDK Runtime Environment (build 11.0.10+9-Ubuntu-0ubuntu1.20.10)

Python Notes: Python 2.7.18 + Python 3.8.6

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_v1`: Mitigation of `usercopy/swaps` barriers and `__user` pointer sanitization + `spectre_v2`: Mitigation of Full AMD retpoline IBPB: conditional IBRS_FW STIBP: always-on RSB filling + `srbds`: Not affected + `tsx_async_abort`: Not affected

2 x Intel Xeon Platinum 8368

Processor: 2 x Intel Xeon Platinum 8368 @ 3.40GHz (76 Cores / 152 Threads), Motherboard: Intel M50CYP2SB2U

(SE5C6200.86B.0022.D08.2103221623 BIOS), Chipset: Intel Device 0998, Memory: 1008GB, Disk: 400GB INTEL SSDPF21Q400GB + 15363GB INTEL SSDPE2NV153T8 + 240GB INTEL SSDSCKKB24, Graphics: ASPEED, Monitor: PHL 223V5, Network: 2 x Intel 10G X550T + 2 x Intel XXV710 for 25GbE SFP28

OS: Ubuntu 20.10, Kernel: 5.8.0-48-generic (x86_64), Compiler: GCC 10.2.0, File-System: xfs, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --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-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgc-n-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/usr,hsa --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-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

Disk Notes: NONE / attr2,inode64,logbsize=32k,logbufs=8,noquota,relatime,rw / Block Size: 4096

Processor Notes: Scaling Governor: intel_pstate performance - CPU Microcode: 0xd000270

Java Notes: OpenJDK Runtime Environment (build 11.0.10+9-Ubuntu-0ubuntu1.20.10)

Python Notes: Python 3.8.6

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

2 x Intel Xeon Platinum 8260M

Processor: 2 x Intel Xeon Platinum 8260M @ 3.90GHz (48 Cores / 96 Threads), Motherboard: Intel S2600WFT (SE5C620.86B.02.01.0013.121520200651 BIOS), Chipset: Intel Sky Lake-E DMI3 Registers, Memory: 756GB, Disk: 15363GB INTEL SSDPE2NV153T8 + 400GB INTEL SSDPF21Q400GB + 240GB INTEL SSDSCKJB24, Graphics: ASPEED, Monitor: PHL 223V5, Network: 2 x Intel X722 for 10GBASE-T + 2 x Intel XXV710 for 25GbE SFP28

OS: Ubuntu 20.10, Kernel: 5.8.0-48-generic (x86_64), Compiler: GCC 10.2.0, File-System: xfs, Screen Resolution: 1920x1080

Kernel Notes: Transparent Huge Pages: madvise

Compiler Notes: --build=x86_64-linux-gnu --disable-vtable-verify --disable-werror --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-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-nvptx/usr,amdgc-n-amdhsa=/build/gcc-10-JvwpWM/gcc-10-10.2.0/debian/tmp-gcn/usr,hsa --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-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

Disk Notes: NONE / attr2,inode64,logbsize=32k,logbufs=8,noquota,relatime,rw / Block Size: 4096

Processor Notes: Scaling Governor: intel_pstate performance - CPU Microcode: 0x4003003

Java Notes: OpenJDK Runtime Environment (build 11.0.10+9-Ubuntu-0ubuntu1.20.10)

Python Notes: Python 3.8.6

Security Notes: itlb_multihit: KVM: Mitigation of VMX disabled + 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: Mitigation of TSX disabled

1 x Ampere Altra Q80-30

Processor: ARMv8 Neoverse-N1 @ 3.00GHz (80 Cores), Motherboard: GIGABYTE MP32-AR1-00 v00030003 (F18g SCP: 1.08.20211002 BIOS), Chipset: Ampere Computing LLC Altra PCI Root Complex A, Memory: 126GB, Disk: 1000GB GIGABYTE GP-AG41TB + 500GB GIGABYTE GP-AG4500G + 16GB Flash Disk, Graphics: ASPEED, Network: 2 x Intel I350

OS: Ubuntu 21.10, Kernel: 5.13.0-21-generic (aarch64), Compiler: GCC 11.2.0, File-System: xfs, Screen Resolution: 1024x768

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-multilib --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
 Disk Notes: NONE / attr2,inode64,logbsize=32k,logbufs=8,noquota,relatime,rw / Block Size: 4096
 Processor Notes: Scaling Governor: cpcp_cpufreq performance (Boost: Disabled)
 Java Notes: OpenJDK Runtime Environment (build 11.0.12+7-Ubuntu-0ubuntu3)
 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 + spectre_v1: Mitigation of __user pointer sanitization + spectre_v2: Not affected + srbds: Not affected + tsx_async_abort: Not affected

	2 x AMD EPYC 7763	2 x AMD EPYC 7543	2 x Intel Xeon Platinum 8368	2 x Intel Xeon Platinum 8260M	1 x Ampere Altra Q80-30
NAS Parallel Benchmarks - EP.D (Mop/s)	10363	5866	9119	4856	3359
Normalized	100%	56.6%	87.99%	46.86%	32.41%
Standard Deviation	1.9%	2.9%	13.7%	2.1%	0.2%
Rodinia - OpenMP LavaMD (sec)	26.213	37.575	38.708	73.474	44.240
Normalized	100%	69.76%	67.72%	35.68%	59.25%
Standard Deviation	2.5%	2.4%	0.8%	0.6%	0%
Rodinia - OpenMP CFD Solver (sec)	6.224	6.397	3.925	6.346	4.346
Normalized	63.06%	61.36%	100%	61.85%	90.31%
Standard Deviation	2%	13.4%	0.5%	0.7%	0.3%
Dolfyn - C.F.D (sec)	18.324	17.148	20.649	21.607	26.045
Normalized	93.58%	100%	83.05%	79.36%	65.84%
Standard Deviation	0.1%	0%	0.1%	0.1%	0.8%
Nebular Empirical Analysis Tool (sec)	30.563	28.237	20.655	33.695	14.830
Normalized	48.52%	52.52%	71.8%	44.01%	100%
Standard Deviation	5.1%	2.2%	4.9%	3.1%	0.7%
Pennant - leblanchig (Hydro Cycle Time - sec)	16.95403	12.68979	4.888998	11.66005	10.52865
Normalized	28.84%	38.53%	100%	41.93%	46.44%
Standard Deviation	0.9%	2.2%	2%	2.2%	0.5%
Timed MAFFT Alignment - M.S.A - LSU RNA (sec)	10.426	9.311	8.715	10.659	10.425
Normalized	83.59%	93.6%	100%	81.76%	83.6%
Standard Deviation	4.4%	1.9%	2.2%	3.3%	0.5%
OpenFOAM - Motorbike 60M	765.47	377.23	102.12	204.76	227.54
Normalized	13.34%	27.07%	100%	49.87%	44.88%
Standard Deviation	19.9%	1%	0.1%	0.3%	0.1%
ACES DGEMM - S.F.P.R (GFLOP/s)	37.604790	18.311647	28.425921	14.063351	17.318379
Normalized	100%	48.69%	75.59%	37.4%	46.05%
Standard Deviation	2.3%	2.1%	0.2%	2.5%	0.9%
Himeno Benchmark - P.P.S (MFLOPS)	3703	3709	4129	3328	3395
Normalized	89.67%	89.84%	100%	80.59%	82.23%
Standard Deviation	5.6%	1.8%	0%	0.1%	1.4%
Numpy Benchmark (Score)	363.22	391.75	396.14	355.52	290.73
Normalized	91.69%	98.89%	100%	89.75%	73.39%
Standard Deviation	0.7%	0.4%	0.2%	0.7%	0.5%
Ngspice - C2670 (sec)	145.824	136.144	128.633	158.370	232.160

	Normalized	88.21%	94.48%	100%	81.22%	55.41%
	Standard Deviation	0.9%	0.8%	0.6%	0.5%	0.6%
Ngspice - C7552 (sec)		113.354	103.659	148.553	152.358	233.130
	Normalized	91.45%	100%	69.78%	68.04%	44.46%
	Standard Deviation	1.1%	2.1%	0.1%	0.2%	0.1%
Kripke (Throughput FoM)		119412673	132528867	173672467	97292812	135917800
	Normalized	68.76%	76.31%	100%	56.02%	78.26%
	Standard Deviation	5.8%	1.1%	0.7%	6.3%	0.4%
OSBench - Create Files		24.004262	21.967675	22.004364	24.712765	28.500300
	Normalized	91.52%	100%	99.83%	88.89%	77.08%
	Standard Deviation	1%	0.7%	0.7%	1.3%	0.2%
OSBench - Create Threads (us/Event)		28.843085	23.477674	16.019344	16.891956	20.799935
	Normalized	55.54%	68.23%	100%	94.83%	77.02%
	Standard Deviation	2.4%	2.4%	0.6%	0.9%	2.5%
OSBench - Launch Programs (us/Event)		69.567045	62.649250	32.489300	39.626758	47.545433
	Normalized	46.7%	51.86%	100%	81.99%	68.33%
	Standard Deviation	4.9%	1.9%	1.3%	0.5%	1%
OSBench - Create Processes (us/Event)		48.923492	47.276338	28.825601	32.223860	42.503675
	Normalized	58.92%	60.97%	100%	89.45%	67.82%
	Standard Deviation	1.5%	3.9%	0.3%	1.5%	1.9%
OSBench - Memory Allocations (Ns/Event)		77.320893	68.823973	69.346666	104.860703	99.916696
	Normalized	89.01%	100%	99.25%	65.63%	68.88%
	Standard Deviation	0.3%	0.5%	0.1%	1.7%	0.4%
BYTE Unix Benchmark - Dhystone 2 (LPS)		40277917	43248926	41456410	38182436	33567845
	Normalized	93.13%	100%	95.86%	88.29%	77.62%
	Standard Deviation	1%	0.2%	0.1%	0.1%	0.1%
CacheBench - Read (MB/s)		2601	2782	2877	3712	11441
	Normalized	22.73%	24.31%	25.15%	32.44%	100%
	Standard Deviation	0%	0%	0%	0%	0%
CacheBench - Write (MB/s)		24981	26691	23648	27566	18985
	Normalized	90.62%	96.82%	85.79%	100%	68.87%
	Standard Deviation	0%	0%	0%	0%	0%
CacheBench - R.M.W (MB/s)		49620	53030	37399	19382	30216
	Normalized	93.57%	100%	70.52%	36.55%	56.98%
	Standard Deviation	0%	0%	0%	0%	0%
Coremark - CoreMark Size 666 - I.P.S (Iterations/Sec)		3733027	2633539	2359710	1322885	1892049
	Normalized	100%	70.55%	63.21%	35.44%	50.68%
	Standard Deviation	2.4%	0.2%	3.5%	2.3%	0.1%
Sysbench - Memory (Events/sec)		7458386	6007638	13427383	12819941	9961557
	Normalized	55.55%	44.74%	100%	95.48%	74.19%
	Standard Deviation	0.7%	0.7%	0.1%	1.8%	2.1%
Sysbench - CPU (Events/sec)		477380	274610	217291	75476	272611
	Normalized	100%	57.52%	45.52%	15.81%	57.11%
	Standard Deviation	0.2%	0.8%	0%	0.3%	0%
FinanceBench - Repo OpenMP (ms)		40846	37281	38934	43008	45540
	Normalized	91.27%	100%	95.75%	86.68%	81.86%
	Standard Deviation	1.5%	1.1%	0.1%	0.2%	0.4%

FinanceBench - Bonds OpenMP	55531	52390	57178	60569	61831
(ms)					
Normalized	94.34%	100%	91.63%	86.5%	84.73%
Standard Deviation	0.5%	0.5%	0.1%	1.1%	0.1%
MariaDB - 128 (Queries/sec)	384	378	202	182	731
Normalized	52.53%	51.71%	27.63%	24.9%	100%
Standard Deviation	5.3%	0.2%	1.5%	0%	0.3%
MariaDB - 256 (Queries/sec)	287	324	171	172	603
Normalized	47.6%	53.73%	28.36%	28.52%	100%
Standard Deviation	2.5%	0.9%	0.4%	0.4%	1.1%
MariaDB - 512 (Queries/sec)	314	325	173	173	474
Normalized	66.24%	68.57%	36.5%	36.5%	100%
Standard Deviation	10%	0.4%	0.5%	0.1%	22.8%
PostgreSQL pgbench - 100 - 250	704577	716556	924156	525874	441496
- Read Only (TPS)					
Normalized	76.24%	77.54%	100%	56.9%	47.77%
Standard Deviation	9.7%	8%	6.4%	1.8%	0.8%
PostgreSQL pgbench - 100 - 250	0.360	0.352	0.273	0.476	0.567
- Read Only - Average Latency					
Normalized	75.83%	77.56%	100%	57.35%	48.15%
Standard Deviation	10.5%	9.2%	6.5%	1.8%	0.8%
PostgreSQL pgbench - 100 - 250	51183	35338	37436	31338	39254
- Read Write (TPS)					
Normalized	100%	69.04%	73.14%	61.23%	76.69%
Standard Deviation	4.8%	2.2%	4.3%	3.5%	0.7%
PostgreSQL pgbench - 100 - 250	4.918	7.094	6.708	8.002	6.383
- Read Write - Average Latency					
Normalized	100%	69.33%	73.32%	61.46%	77.05%
Standard Deviation	5.3%	2.2%	4.3%	3.5%	0.7%
SQLite Speedtest - Timed Time -	59.337	55.777	59.555	65.235	90.170
Size 1,000 (sec)					
Normalized	94%	100%	93.66%	85.5%	61.86%
Standard Deviation	0.4%	0.7%	1.2%	0.2%	0.2%
Redis - LPOP (Reqs/sec)	2359254	2410419	2843902	2659032	2010777
Normalized	82.96%	84.76%	100%	93.5%	70.7%
Standard Deviation	8.4%	2.4%	0.1%	0.9%	2.3%
Redis - SADD (Reqs/sec)	2037944	1985172	2224301	2077706	1538628
Normalized	91.62%	89.25%	100%	93.41%	69.17%
Standard Deviation	7.9%	0.9%	2%	2%	1.1%
Redis - LPUSH (Reqs/sec)	1560259	1569646	1679884	1633413	1159959
Normalized	92.88%	93.44%	100%	97.23%	69.05%
Standard Deviation	6.9%	1.4%	1.1%	0.3%	2.2%
Redis - GET (Reqs/sec)	2319619	2382131	2712763	2483483	1855696
Normalized	85.51%	87.81%	100%	91.55%	68.41%
Standard Deviation	4.4%	1.6%	0.2%	2.3%	1.8%
Redis - SET (Reqs/sec)	1772195	1782419	1975204	1854411	1425646
Normalized	89.72%	90.24%	100%	93.88%	72.18%
Standard Deviation	6.8%	1.6%	0.7%	2%	2.9%
Apache Cassandra - Mixed 1:3	15671	13407	29971	35945	10163
(Op/s)					
Normalized	43.6%	37.3%	83.38%	100%	28.27%
Standard Deviation	171.9%	148.4%	148.2%	86.2%	129.9%

FLAC Audio Encoding - WAV To	8.874	8.565	9.999	10.032	27.448
FLAC (sec)					
Normalized	96.52%	100%	85.66%	85.38%	31.2%
Standard Deviation	0.2%	0.6%	0.3%	0.9%	0.2%
LAME MP3 Encoding - WAV To	8.089	7.590	9.087	10.114	9.279
MP3 (sec)					
Normalized	93.83%	100%	83.53%	75.04%	81.8%
Standard Deviation	0.1%	0.3%	0.2%	0.1%	0%
Zstd Compression - 8 -	2580	3116	1984	1083	893.5
Compression Speed (MB/s)					
Normalized	82.78%	100%	63.67%	34.75%	28.67%
Standard Deviation	7.1%	5.5%	3.3%	1.4%	0.4%
Zstd Compression - 8 - D.S	3433	3650	3013	2457	2711
Normalized	94.06%	100%	82.56%	67.33%	74.28%
Standard Deviation	2.7%	2.2%	0.6%	1.2%	1%
dav1d - Chimera 1080p (FPS)	1438	1179	1324	899.38	721.63
Normalized	100%	82.02%	92.1%	62.56%	50.19%
Standard Deviation	4.9%	2.7%	0.2%	0.8%	0.4%
dav1d - C.1.1.b (FPS)	339.89	275.05	261.53	194.70	420.58
Normalized	80.81%	65.4%	62.18%	46.29%	100%
Standard Deviation	2.3%	0.8%	2.9%	0.2%	0.3%
Kvazaar - Bosphorus 1080p -	74.72	82.65	67.50	43.09	17.59
Medium (FPS)					
Normalized	90.41%	100%	81.67%	52.14%	21.28%
Standard Deviation	0.1%	1.1%	0.9%	0.1%	0.2%
x264 - H.2.V.E (FPS)	212.80	230.85	225.74	147.33	174.31
Normalized	92.18%	100%	97.79%	63.82%	75.51%
Standard Deviation	4.2%	10%	14.9%	9.3%	0.4%
x265 - Bosphorus 1080p (FPS)	69.73	70.40	76.78	62.75	24.76
Normalized	90.82%	91.69%	100%	81.73%	32.25%
Standard Deviation	2.5%	4.1%	1%	0.4%	0.2%
7-Zip Compression - C.S.T	428677	306883	329337	182082	210443
Normalized	100%	71.59%	76.83%	42.48%	49.09%
Standard Deviation	3.4%	2%	1.8%	1.6%	2.3%
Timed Linux Kernel Compilation	19.526	24.134	22.460	34.706	73.886
- Time To Compile (sec)					
Normalized	100%	80.91%	86.94%	56.26%	26.43%
Standard Deviation	2.7%	3.2%	2.4%	2.2%	1.5%
C-Ray - Total Time - 4.1.R.P.P	6.095	10.079	10.590	20.458	10.389
(sec)					
Normalized	100%	60.47%	57.55%	29.79%	58.67%
Standard Deviation	1%	0.9%	0.2%	19.7%	0.1%
POV-Ray - Trace Time (sec)	7.691	9.211	9.275	18.215	10.620
Normalized	100%	83.5%	82.92%	42.22%	72.42%
Standard Deviation	2.2%	1.3%	1%	18%	0.2%
Gzip Compression - L.S.T.A.T.t.g	41.393	38.798	40.871	41.432	44.110
(sec)					
Normalized	93.73%	100%	94.93%	93.64%	87.96%
Standard Deviation	0.1%	0.2%	0.1%	0.9%	0.2%
OpenSSL - R.4.b.P (Signs/sec)	26545	15764	18137	10412	3947
Normalized	100%	59.39%	68.33%	39.22%	14.87%
Standard Deviation	0.1%	0.1%	0.2%	0.2%	0%
GnuPG - 2.7.S.F.E (sec)	76.436	71.486	77.601	72.750	59.585
Normalized	77.95%	83.35%	76.78%	81.9%	100%

Standard Deviation	1.2%	1.1%	0.8%	1.2%	2.3%
Java SciMark - Composite	2587	2785	2113	2032	1820
Normalized	92.89%	100%	75.86%	72.95%	65.35%
Standard Deviation	0.8%	0.7%	0.4%	1.2%	0.1%
Java SciMark - Monte Carlo	1377	1472	839.19	959.23	919.30
(Mflops)					
Normalized	93.55%	100%	57%	65.16%	62.45%
Standard Deviation	0.4%	0.5%	0%	0%	0%
Java SciMark - F.F.T (Mflops)	1952	2098	1536	1298	1191
Normalized	93.07%	100%	73.21%	61.88%	56.8%
Standard Deviation	0.7%	0.9%	0.7%	6.2%	0.3%
Java SciMark - S.M.M (Mflops)	2281	2449	2143	1553	1184
Normalized	93.14%	100%	87.48%	63.39%	48.35%
Standard Deviation	0.6%	0.1%	0%	0%	0.2%
Java SciMark - D.L.M.F (Mflops)	5715	6183	4576	4785	4196
Normalized	92.42%	100%	74%	77.38%	67.86%
Standard Deviation	1.7%	1.6%	0.7%	1.4%	0%
Java SciMark - J.S.O.R (Mflops)	1612	1725	1472	1565	1611
Normalized	93.44%	100%	85.34%	90.74%	93.42%
Standard Deviation	0%	0.1%	0%	0%	0%
Renaissance - Scala Dotty (ms)	1572	1498	1667	1883	2383
Normalized	95.34%	100%	89.91%	79.56%	62.88%
Standard Deviation	2.4%	2.4%	0.9%	2.4%	1.4%
Renaissance - Rand Forest (ms)	1687	1616	1789	1993	2261
Normalized	95.79%	100%	90.32%	81.08%	71.46%
Standard Deviation	3%	4.5%	2.4%	2.4%	2.1%
Renaissance - Apache Spark	2072	1915	2172	2528	2743
ALS (ms)					
Normalized	92.4%	100%	88.16%	75.74%	69.82%
Standard Deviation	5.4%	1.8%	1.2%	1.1%	1.1%
Renaissance - Apache Spark	97.114	98.685	91.491	129.600	109.230
Bayes (ms)					
Normalized	94.21%	92.71%	100%	70.59%	83.76%
Standard Deviation	25.9%	33.6%	24.4%	25.4%	62.9%
Renaissance - A.S.P (ms)	4601	4082	3306	4357	4606
Normalized	71.85%	80.98%	100%	75.88%	71.77%
Standard Deviation	9.8%	8.5%	6.2%	4.5%	5%
Renaissance - T.H.R (ms)	5558	3447	3158	3737	4115
Normalized	56.82%	91.63%	100%	84.51%	76.76%
Standard Deviation	4.4%	0.9%	1.4%	2%	2.5%
Renaissance - A.U.C.T (ms)	31103	26851	12307	17099	30128
Normalized	39.57%	45.84%	100%	71.98%	40.85%
Standard Deviation	3.1%	2.8%	4.2%	2.1%	4.7%
Renaissance - G.A.U.J.F (ms)	1742	1619	1558	1905	1925
Normalized	89.49%	96.27%	100%	81.82%	80.98%
Standard Deviation	10.7%	14%	12.1%	6%	3%
PostMark - D.T.P (TPS)	8524	8928	7896	6522	4808
Normalized	95.47%	100%	88.44%	73.05%	53.85%
Standard Deviation	1.9%		1.8%	1.5%	1.9%
oneDNN - C.B.S.A - f32 - CPU	0.618082	0.746819	1.56305	4.56668	10.3239
(ms)					
Normalized	100%	82.76%	39.54%	13.53%	5.99%
Standard Deviation	0.3%	1.6%	0.2%	0.1%	0.1%
oneDNN - D.B.s - f32 - CPU (ms)	2.53956	1.88246	1.08309	1.48023	34.3310
Normalized	42.65%	57.54%	100%	73.17%	3.15%

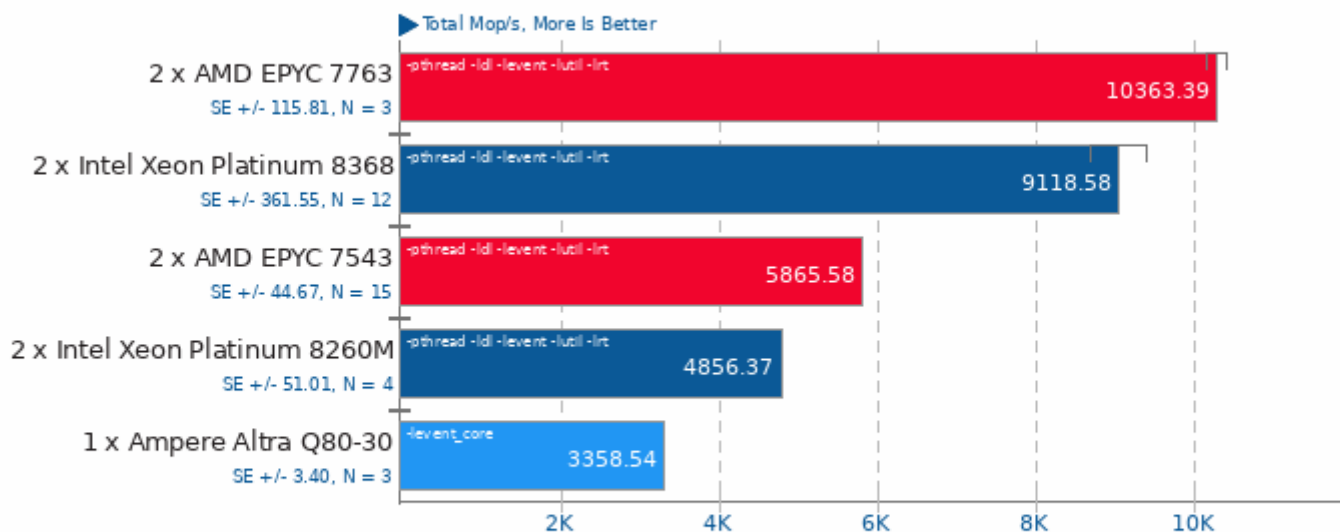
Standard Deviation	2.2%	2.1%	0.2%	1.2%	0.3%
oneDNN - C.B.S.A - u8s8f32 - CPU (ms)	1.040769	1.015001	1.20263	4.33270	16.3061
Normalized	97.52%	100%	84.4%	23.43%	6.22%
Standard Deviation	11.3%	11%	0.7%	0.4%	16.1%
oneDNN - D.B.s - u8s8f32 - CPU (ms)	1.65651	1.42739	0.335154	0.438041	89.3792
Normalized	20.23%	23.48%	100%	76.51%	0.37%
Standard Deviation	1.9%	2.4%	0.8%	0.4%	1.5%
oneDNN - R.N.N.T - f32 - CPU (ms)	1850	1400	623.537	1140	6001
Normalized	33.71%	44.54%	100%	54.69%	10.39%
Standard Deviation	4.6%	4.8%	0.1%	9.9%	0.4%
oneDNN - R.N.N.I - f32 - CPU	1718	1117	411.961	730.360	1510
Normalized	23.99%	36.88%	100%	56.41%	27.29%
Standard Deviation	6.4%	8.2%	1.2%	4.1%	0.2%
oneDNN - R.N.N.T - u8s8f32 - CPU (ms)	1817	1413	623.629	1112	5984
Normalized	34.32%	44.12%	100%	56.07%	10.42%
Standard Deviation	7.1%	5.8%	0.7%	6.2%	0.4%
oneDNN - R.N.N.I - u8s8f32 - CPU (ms)	1723	1115	409.647	731.058	1508
Normalized	23.78%	36.73%	100%	56.03%	27.16%
Standard Deviation	8.8%	5.8%	0.7%	4.6%	0.5%
oneDNN - M.M.B.S.T - f32 - CPU (ms)	0.498212	0.435059	0.235915	0.398769	2.71433
Normalized	47.35%	54.23%	100%	59.16%	8.69%
Standard Deviation	1.3%	4.1%	1.8%	2.4%	31.4%
oneDNN - R.N.N.T - bf16bf16bf16 - CPU (ms)	1757	1375	628.754	1078	5983
Normalized	35.78%	45.74%	100%	58.34%	10.51%
Standard Deviation	5%	1.6%	1.5%	0.3%	0.2%
oneDNN - R.N.N.I - bf16bf16bf16 - CPU (ms)	1707	1234	411.918	719.112	1504
Normalized	24.12%	33.38%	100%	57.28%	27.39%
Standard Deviation	9.4%	0.8%	0.2%	2.1%	0.3%
oneDNN - M.M.B.S.T - u8s8f32 - CPU (ms)	0.701525	0.689266	0.216025	0.324278	24.3967
Normalized	30.79%	31.34%	100%	66.62%	0.89%
Standard Deviation	1.3%	0.8%	1.9%	3.6%	6.4%
TNN - CPU - MobileNet v2 (ms)	345.543	288.849	357.927	362.408	308.931
Normalized	83.59%	100%	80.7%	79.7%	93.5%
Standard Deviation	0.4%	1.4%	0%	0.5%	0.1%
TNN - CPU - SqueezeNet v1.1 (ms)	295.740	276.862	366.176	345.567	301.668
Normalized	93.62%	100%	75.61%	80.12%	91.78%
Standard Deviation	0%	0.1%	0%	0%	2.2%
PyBench - T.F.A.T.T	972	917	984	1135	1403
Normalized	94.34%	100%	93.19%	80.79%	65.36%
Standard Deviation	0.5%	0.5%	0.2%		0.1%
PyPerformance - go	256	238	250	250	301
Normalized	92.97%	100%	95.2%	95.2%	79.07%
Standard Deviation		0.2%			0.2%

PyPerformance - 2to3	321	301	309	321	392
(Milliseconds)					
Normalized	93.77%	100%	97.41%	93.77%	76.79%
Standard Deviation	0.2%				0.1%
PyPerformance - chaos	111	104	102	106	124
(Milliseconds)					
Normalized	91.89%	98.08%	100%	96.23%	82.26%
Standard Deviation	1%	0.6%			0%
PyPerformance - float	115	107	112	114	149
(Milliseconds)					
Normalized	93.04%	100%	95.54%	93.86%	71.81%
Standard Deviation					0%
PyPerformance - nbody	119	111	108	127	146
(Milliseconds)					
Normalized	90.76%	97.3%	100%	85.04%	73.97%
Standard Deviation		0.5%			0%
PyPerformance - pathlib	18.1	17.3	16.4	18.0	24.1
(Milliseconds)					
Normalized	90.61%	94.8%	100%	91.11%	68.05%
Standard Deviation	0%	0%	0.4%	0.3%	0.2%
PyPerformance - raytrace	478	447	472	474	587
(Milliseconds)					
Normalized	93.51%	100%	94.7%	94.3%	76.15%
Standard Deviation	0.2%	0.2%	0.3%		0.1%
PyPerformance - json_loads	23.8	22.3	22.4	26.7	29.4
(Milliseconds)					
Normalized	93.7%	100%	99.55%	83.52%	75.85%
Standard Deviation	0.2%	0.3%	0%	0.2%	0.2%
PyPerformance - crypto_pyaes	106	99.5	103	113	128
(Milliseconds)					
Normalized	93.87%	100%	96.6%	88.05%	77.73%
Standard Deviation		0.3%			0%
PyPerformance - regex_compile	171	159	165	167	177
(Milliseconds)					
Normalized	92.98%	100%	96.36%	95.21%	89.83%
Standard Deviation					0%
PyPerformance - python_startup	8.17	7.68	8.00	8.32	10.5
(Milliseconds)					
Normalized	94%	100%	96%	92.31%	73.14%
Standard Deviation	0.3%	0.5%	0.1%	0.2%	0.5%
PyPerformance - django_template	49.2	45.2	47.3	48.1	58.8
(Milliseconds)					
Normalized	91.87%	100%	95.56%	93.97%	76.87%
Standard Deviation	0.1%	0.1%	0.2%	0.2%	0.1%
PyPerformance - pickle_pure_python	447	404	428	435	538
Normalized	90.38%	100%	94.39%	92.87%	75.09%
Standard Deviation	0.4%	0.4%		0.4%	0.1%
Apache Benchmark - S.W.P.S	22343	23701	35223	25464	26599
(Reqs/sec)					
Normalized	63.43%	67.29%	100%	72.29%	75.52%
Standard Deviation	8.6%	1.3%	2.4%	0.7%	0.2%
PHPBench - P.B.S (Score)	592611	639114	721246	655461	522337

Normalized	82.16%	88.61%	100%	90.88%	72.42%
Standard Deviation	0.9%	0.5%	0.6%	0.1%	0.4%

NAS Parallel Benchmarks 3.4

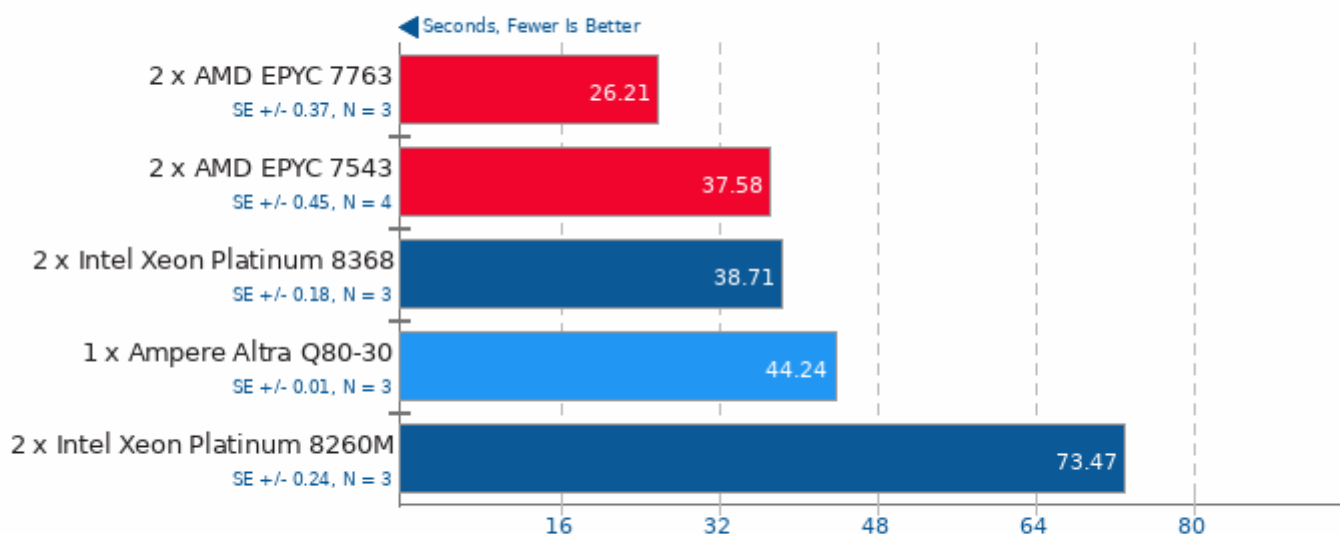
Test / Class: EP.D



1. (F9X) gfortran options: -O3 -march=native -lmpi_usempif08 -lmpi_mpifh -lmpi -lopen-rte -lopen-pal -lhwloc -levent_pthreads -lm -lz
2. Open MPI 4.0.3

Rodinia 3.1

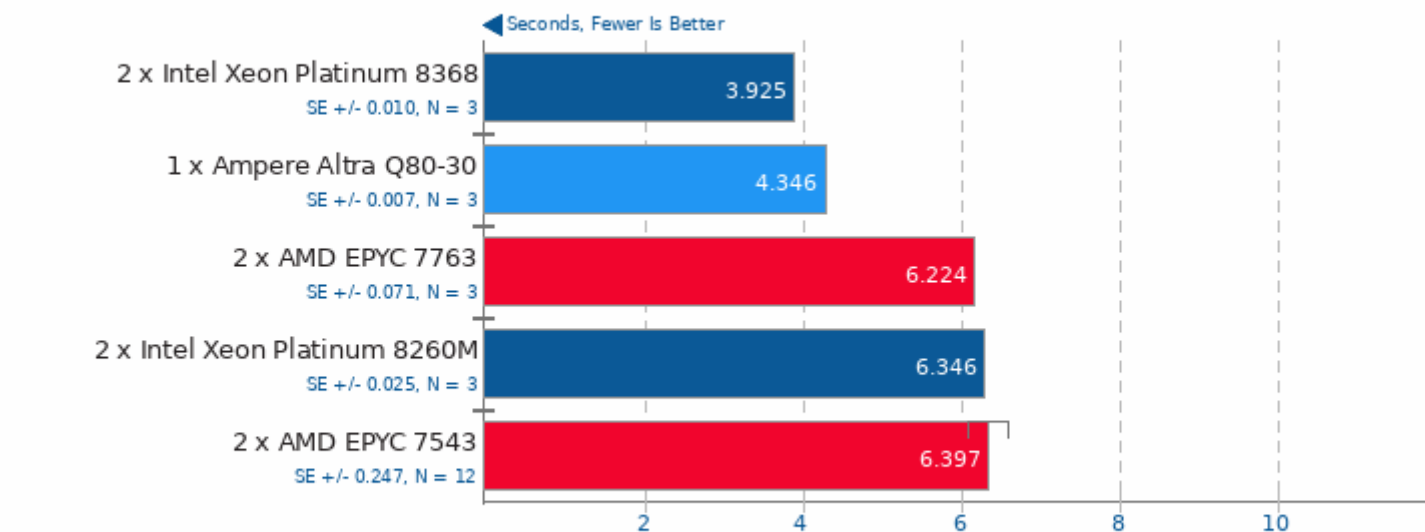
Test: OpenMP LavaMD



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

Rodinia 3.1

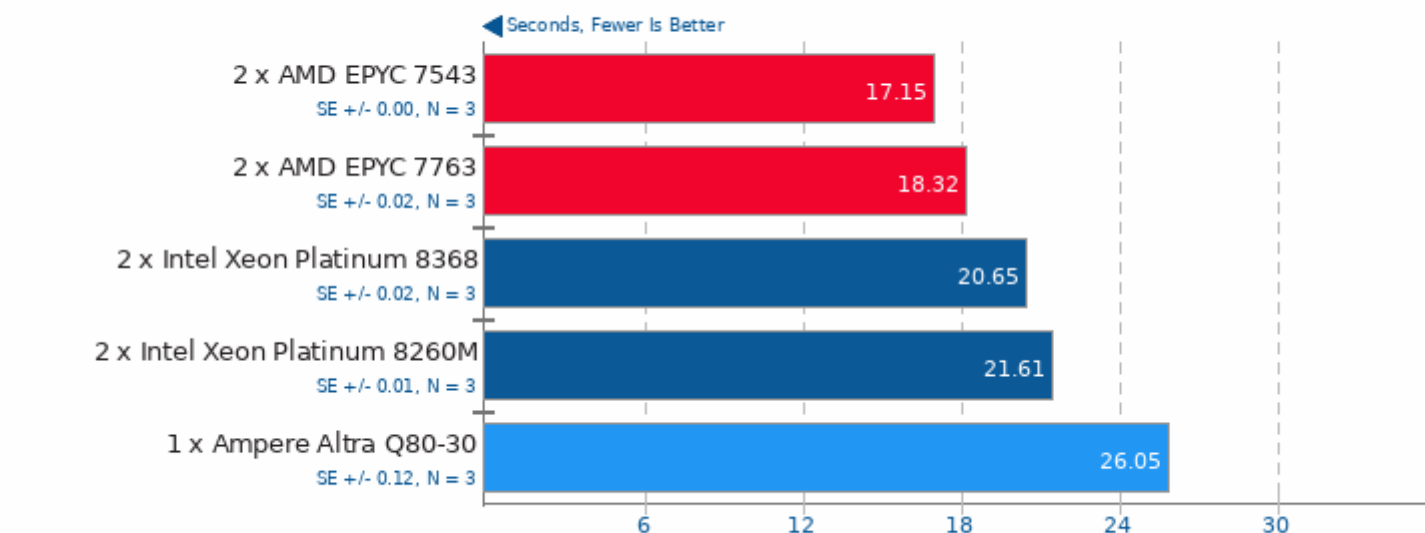
Test: OpenMP CFD Solver



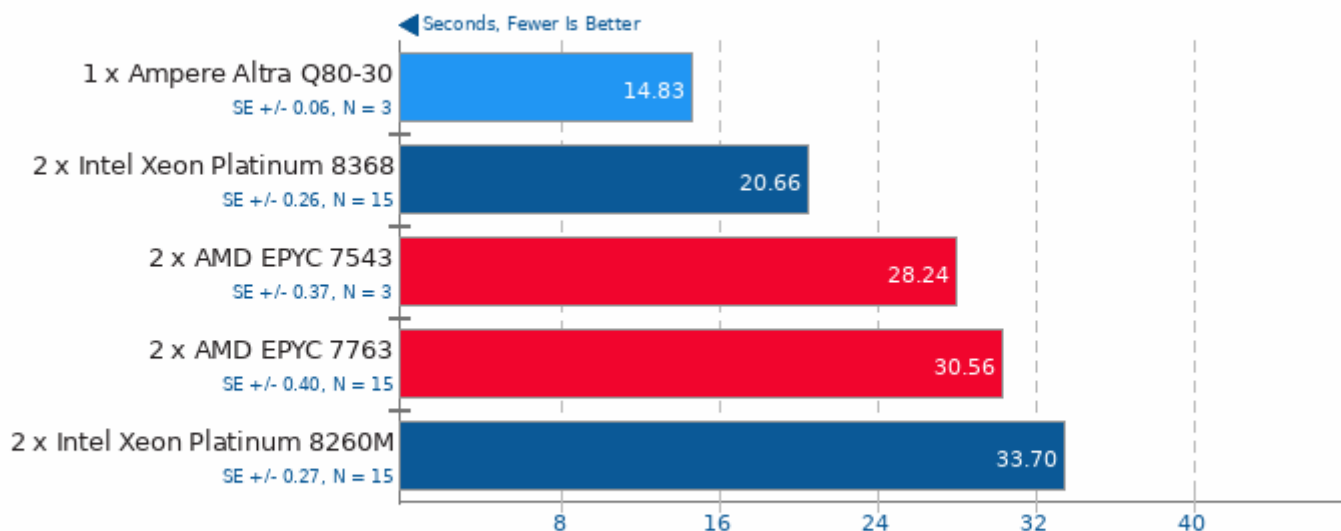
1. (CXX) g++ options: -O2 -lOpenCL

Dolfyn 0.527

Computational Fluid Dynamics



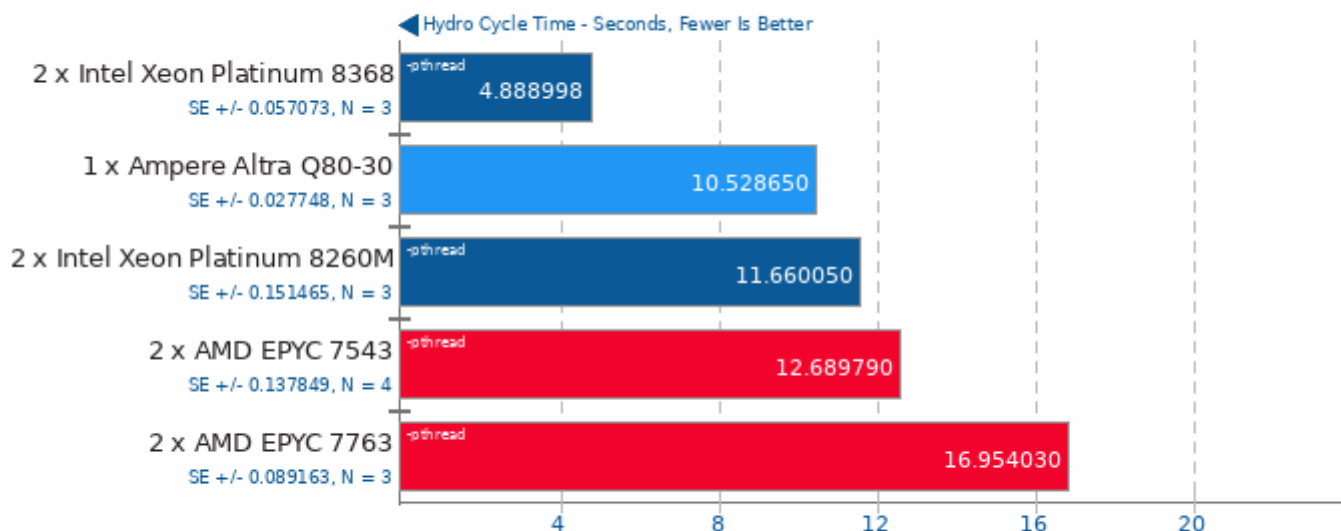
Nebular Empirical Analysis Tool 2020-02-29



1. (F9X) gfortran options: -cpp -ffree-line-length-0 -jsource/ -fopenmp -O3 -fno-backtrace

Pennant 1.0.1

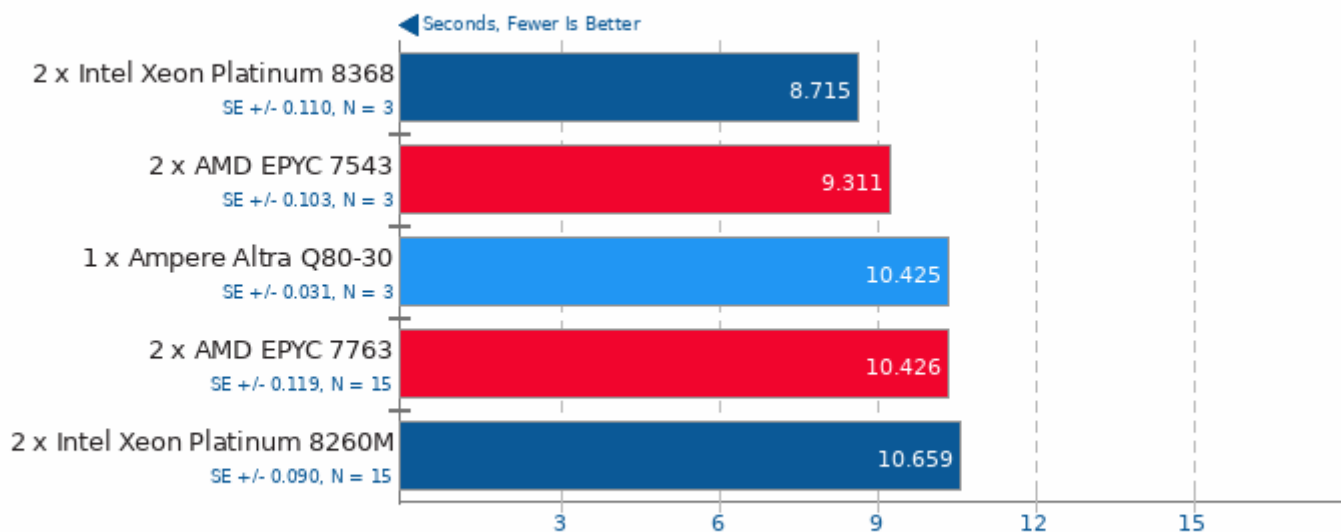
Test: leblancbig



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

Timed MAFFT Alignment 7.471

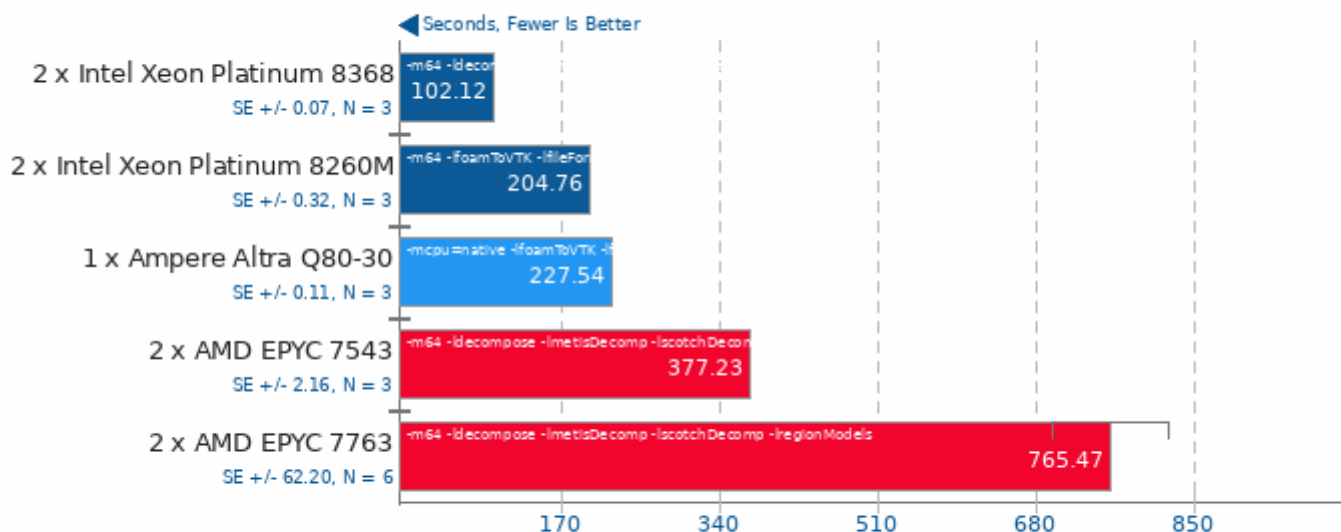
Multiple Sequence Alignment - LSU RNA



1. (CC) gcc options: -std=c99 -O3 -lm -lpthread

OpenFOAM 8

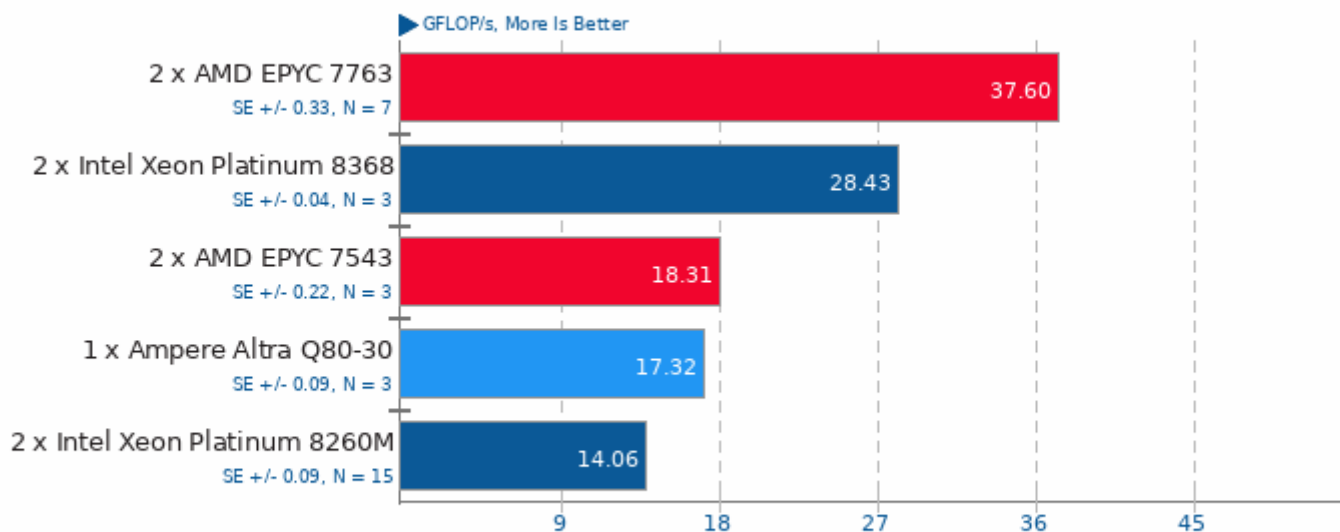
Input: Motorbike 60M



1. (CXX) g++ options: -std=c++11 -O3 -ftemplate-depth-100 -fPIC -fuse-ld=bfd -Xlinker --add-needed --no-as-needed -ldynamicMesh -lgenericPatchFields -llagrangia

ACES DGEMM 1.0

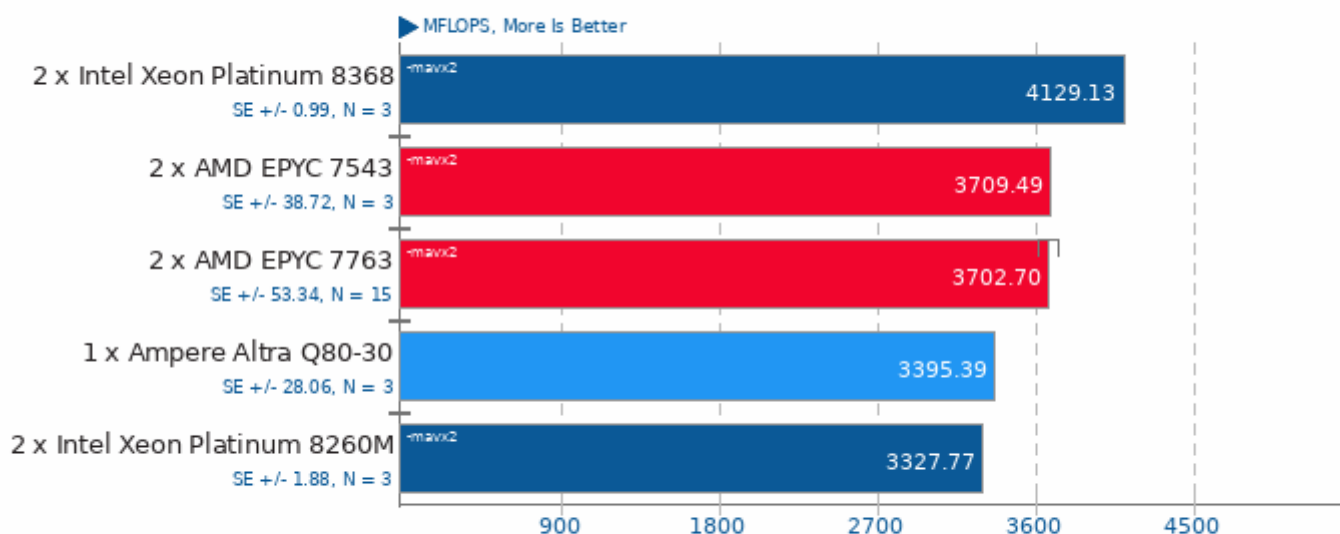
Sustained Floating-Point Rate



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

Himeno Benchmark 3.0

Poisson Pressure Solver



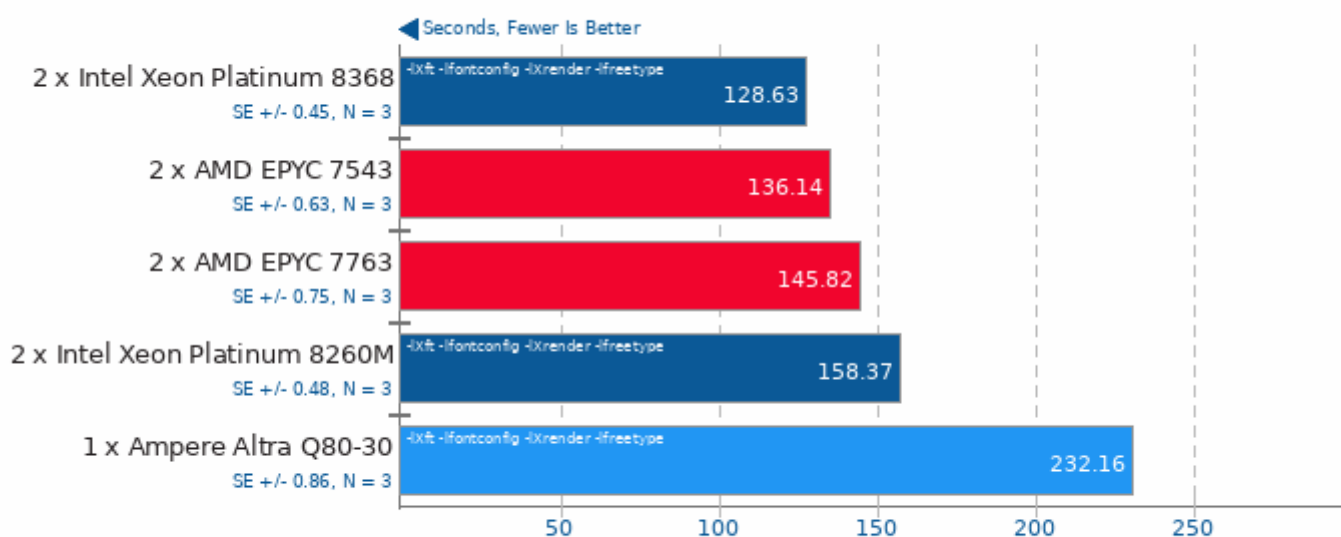
1. (CC) gcc options: -O3

Numpy Benchmark



Ngspice 34

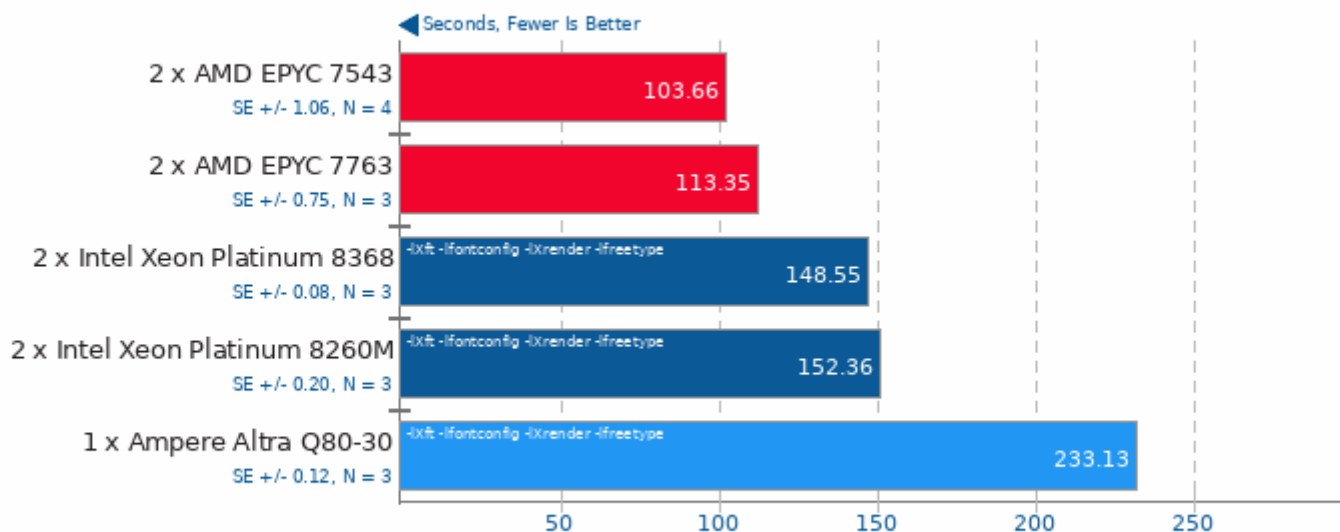
Circuit: C2670



1. (CC) gcc options: -O0 -fopenmp -lm -lstdc++ -lfftw3 -lXaw -lXmu -lXt -lXext -lX11 -lSM -lICE

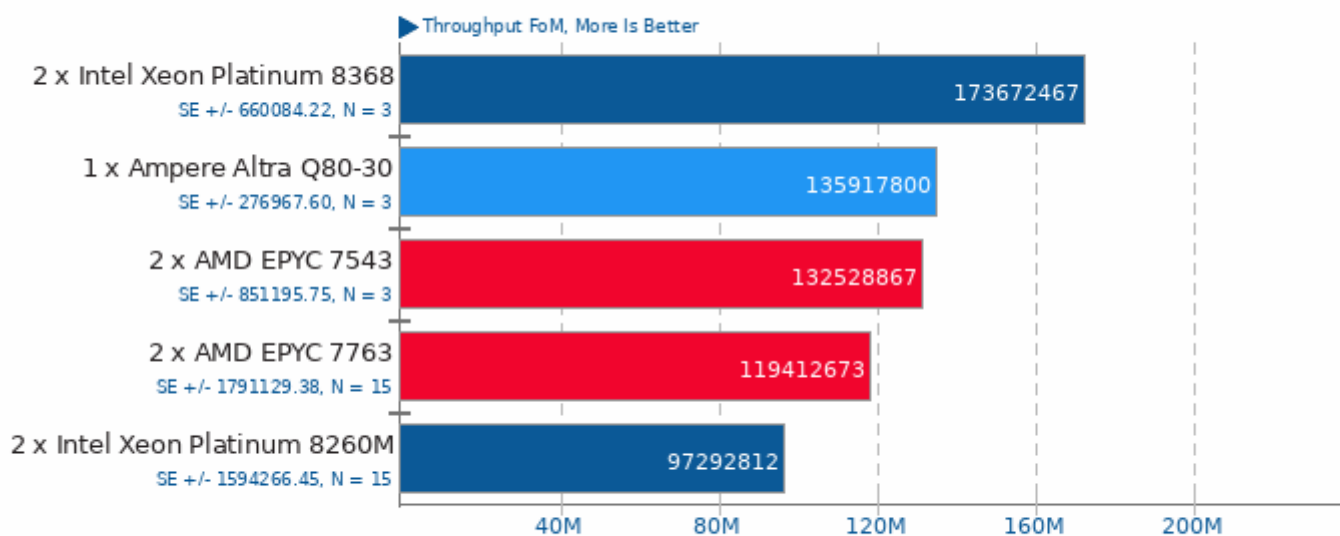
Ngspice 34

Circuit: C7552



1. (CC) gcc options: -O0 -fopenmp -lm -lstdc++ -lfftw3 -lXaw -lXmu -lXt -lXext -lX11 -lSM -lICE

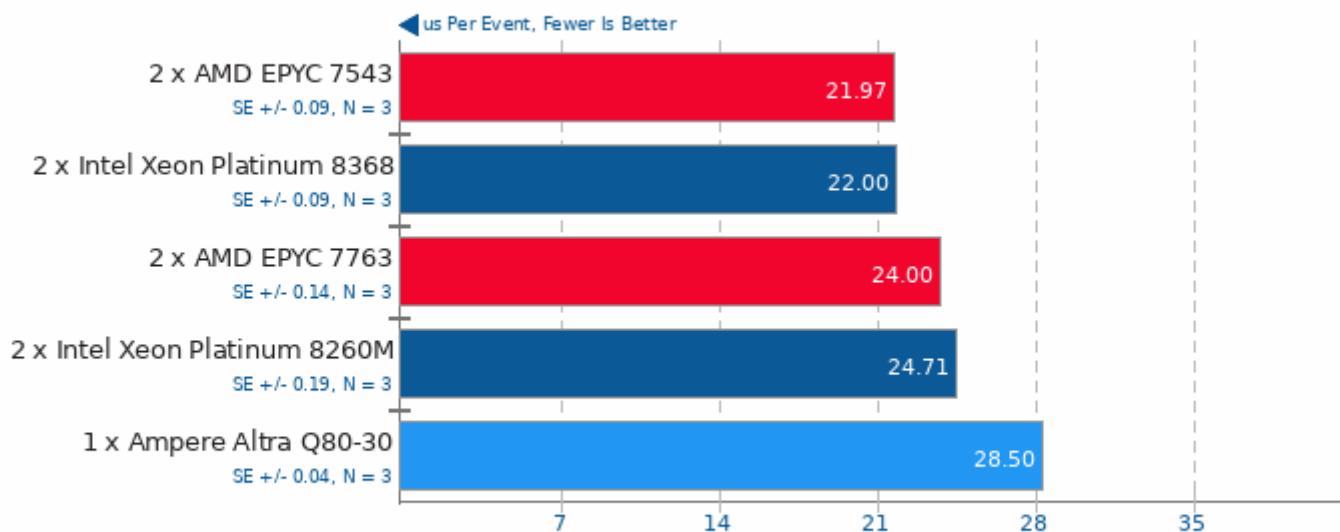
Kripke 1.2.4



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

OSBench

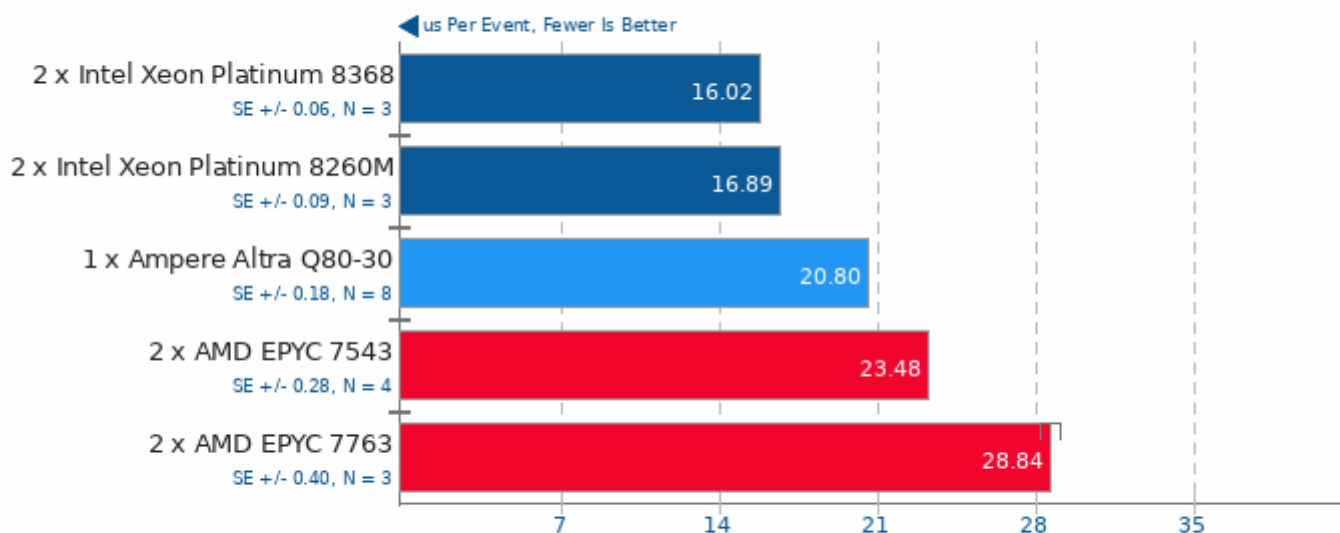
Test: Create Files



1. (CC) gcc options: -lm

OSBench

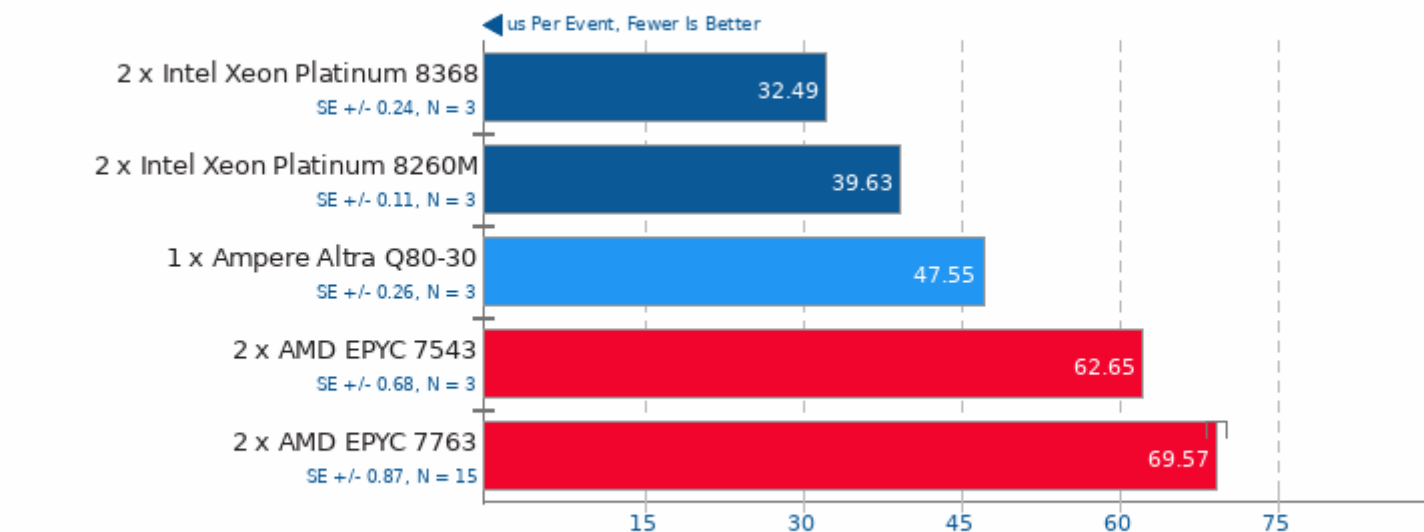
Test: Create Threads



1. (CC) gcc options: -lm

OSBench

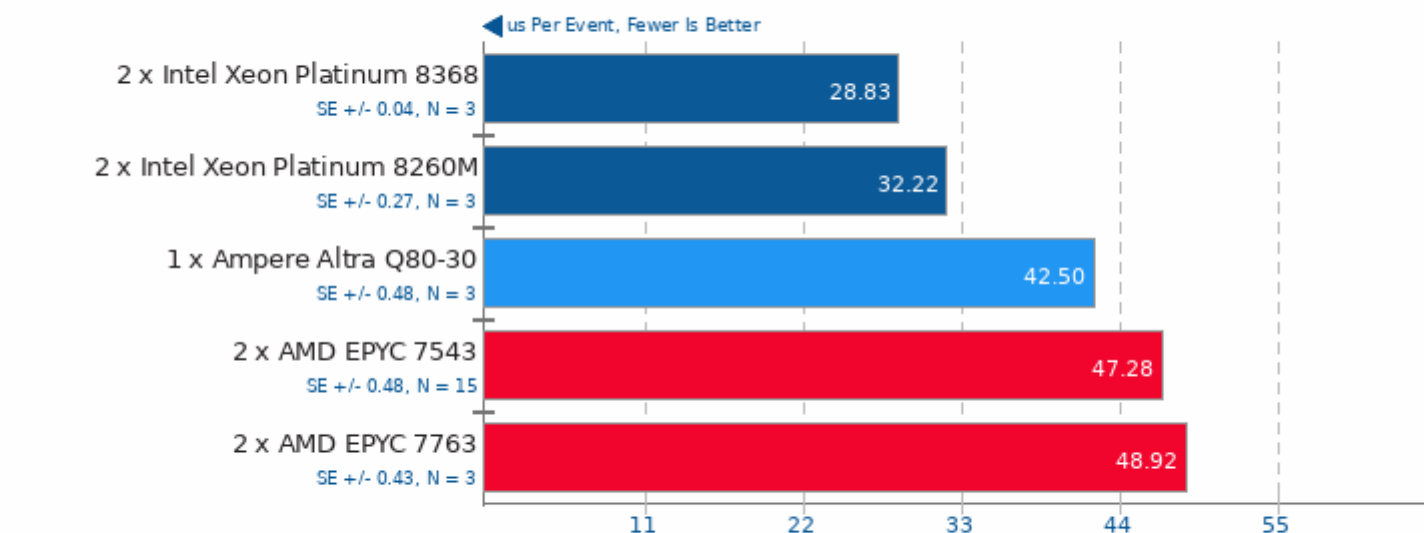
Test: Launch Programs



1. (CC) gcc options: -lm

OSBench

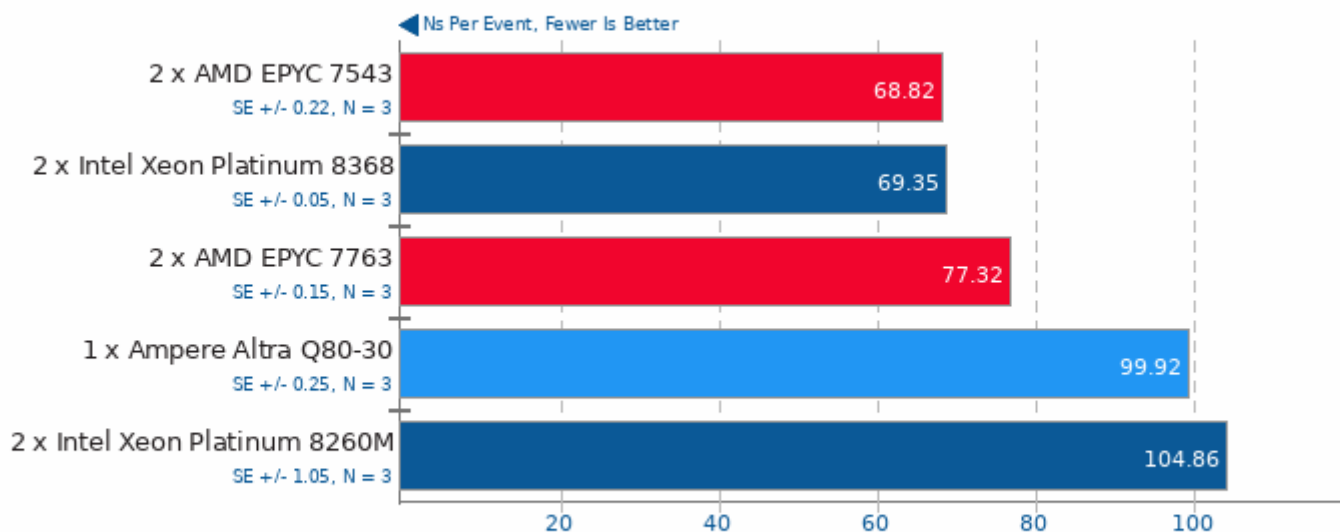
Test: Create Processes



1. (CC) gcc options: -lm

OSBench

Test: Memory Allocations



1. (CC) gcc options: -lm

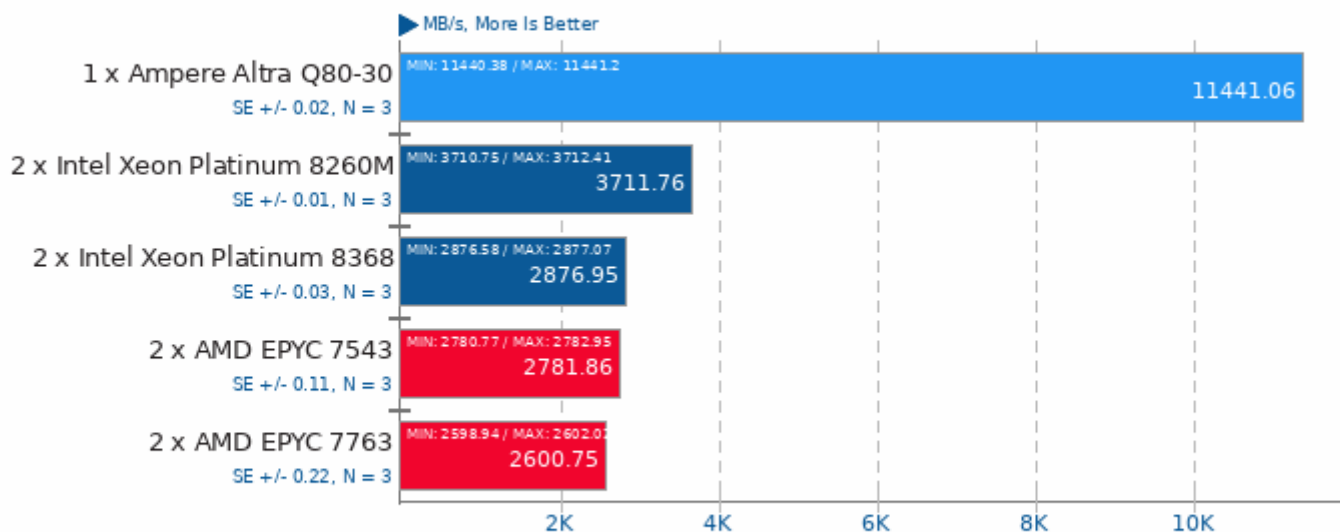
BYTE Unix Benchmark 3.6

Computational Test: Dhrystone 2



CacheBench

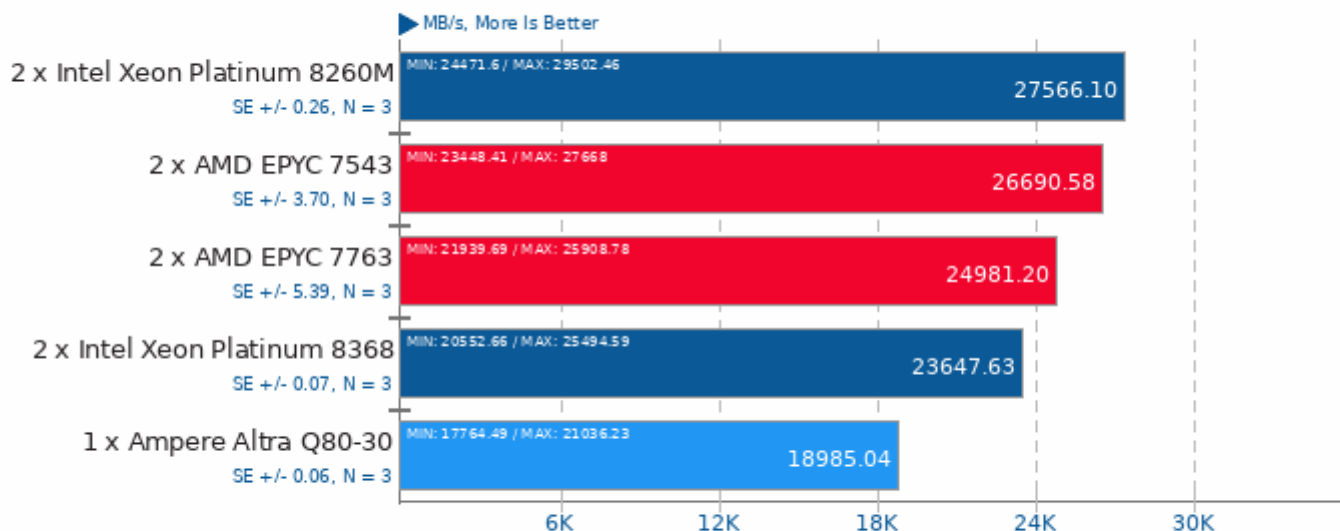
Test: Read



1. (CC) gcc options: -lrt

CacheBench

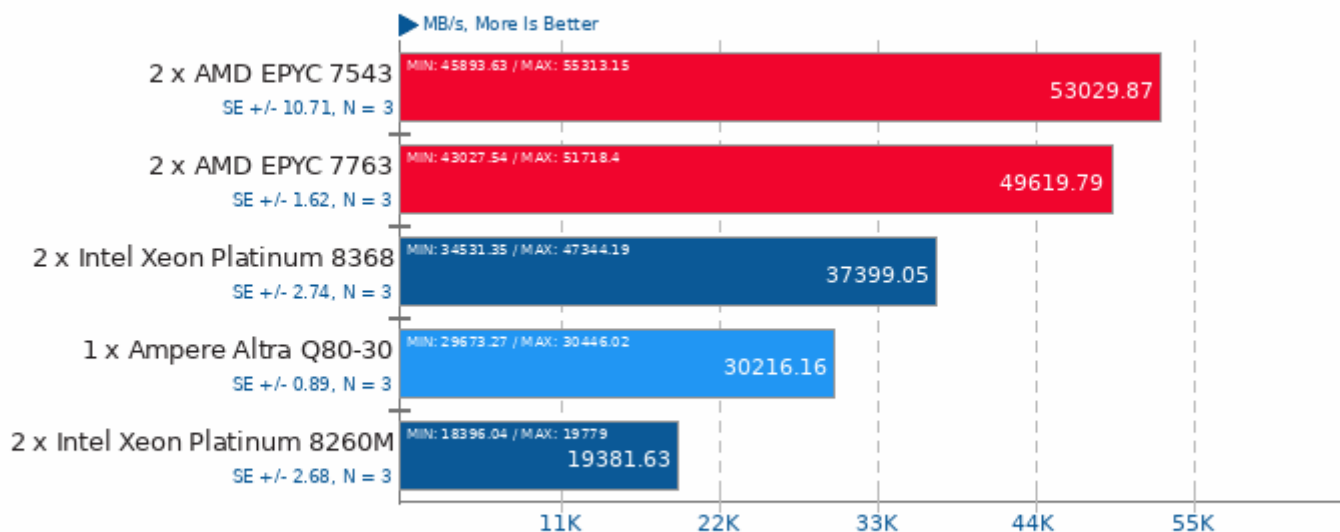
Test: Write



1. (CC) gcc options: -lrt

CacheBench

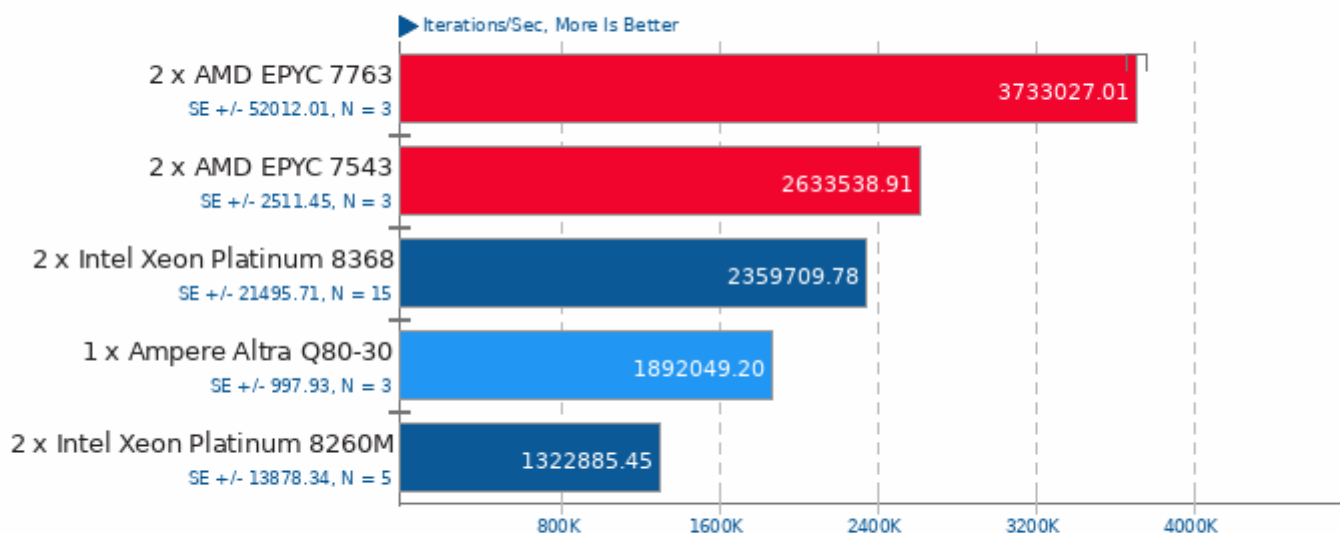
Test: Read / Modify / Write



1. (CC) gcc options: -lrt

Coremark 1.0

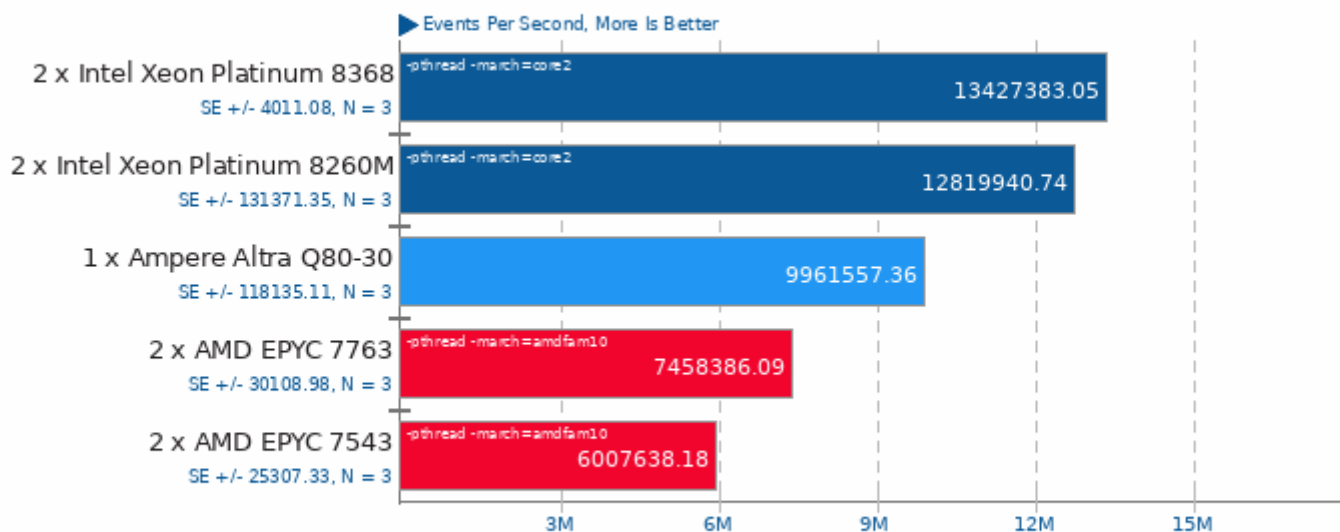
CoreMark Size 666 - Iterations Per Second



1. (CC) gcc options: -O2 -lrt -lrt

Sysbench 2018-07-28

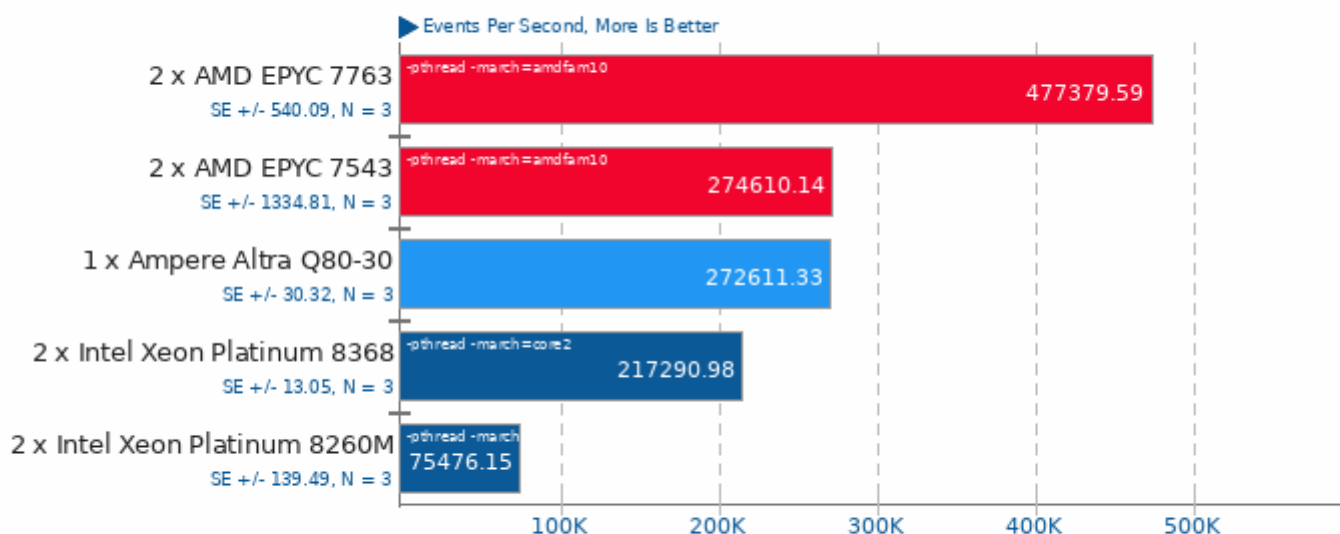
Test: Memory



1. (CC) gcc options: -O3 -funroll-loops -ggdb3 -rdynamic -ldl -laio -lm

Sysbench 2018-07-28

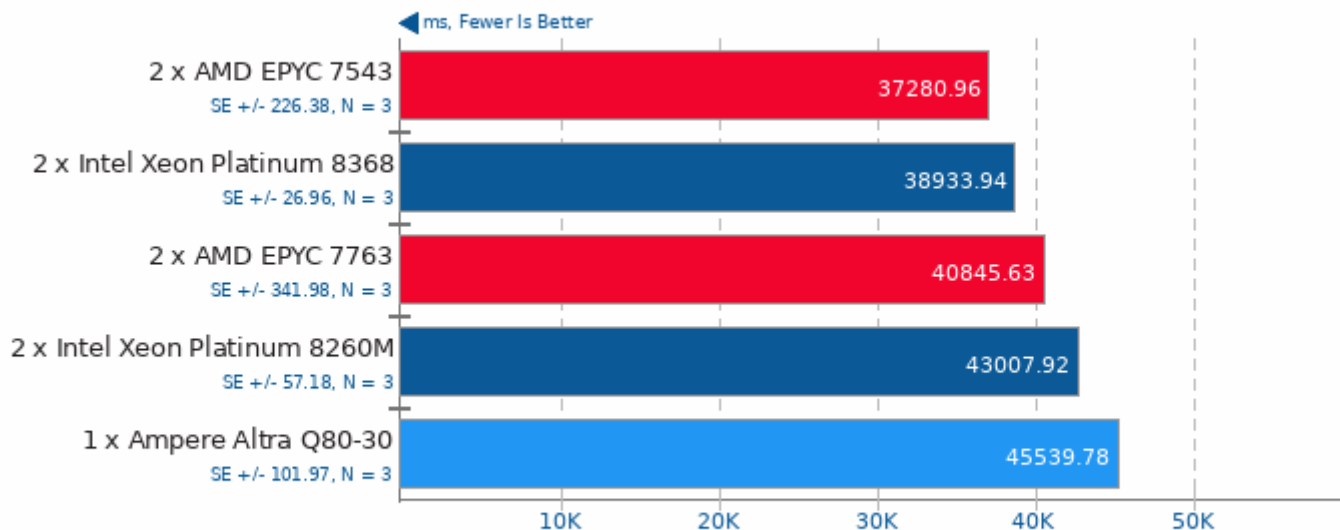
Test: CPU



1. (CC) gcc options: -O3 -funroll-loops -ggdb3 -rdynamic -ldl -laio -lm

FinanceBench 2016-07-25

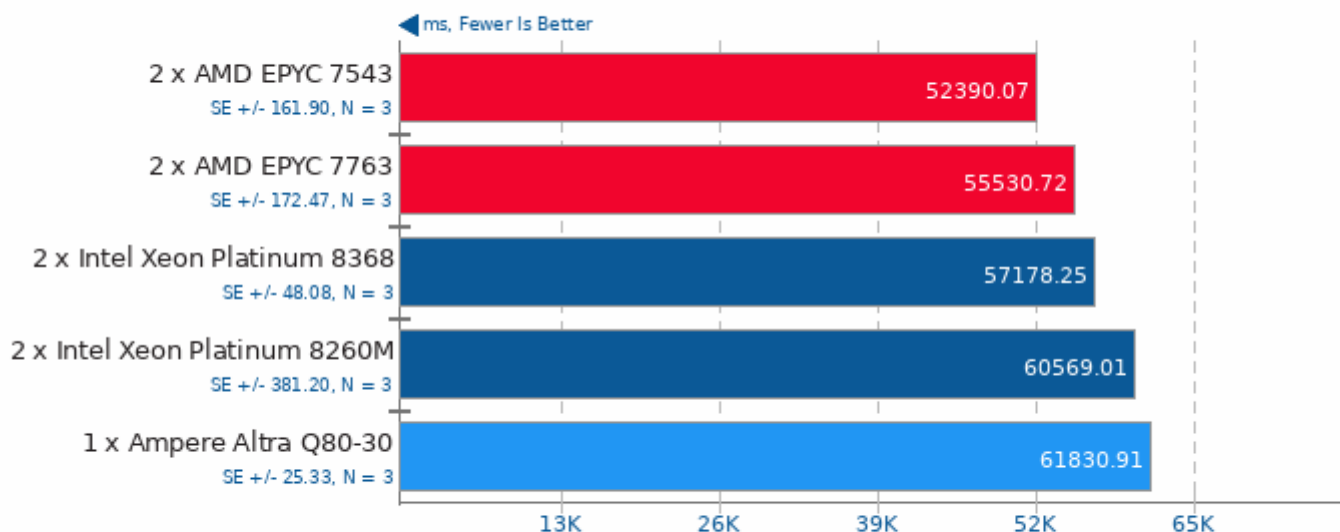
Benchmark: Repo OpenMP



1. (CXX) g++ options: -O3 -march=native -fopenmp

FinanceBench 2016-07-25

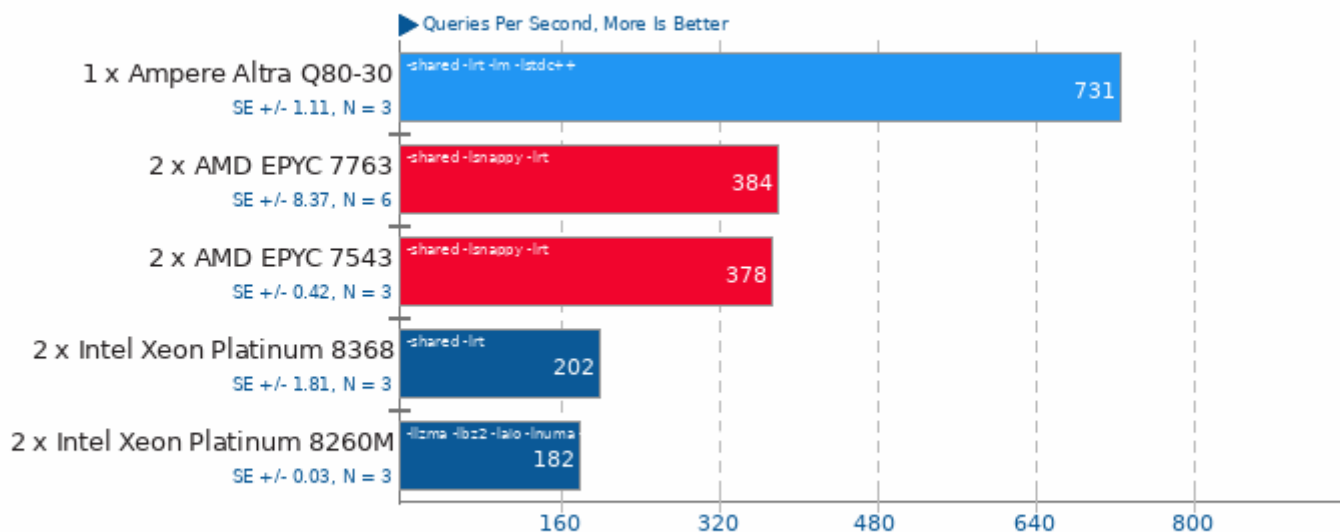
Benchmark: Bonds OpenMP



1. (CXX) g++ options: -O3 -march=native -fopenmp

MariaDB 10.5.2

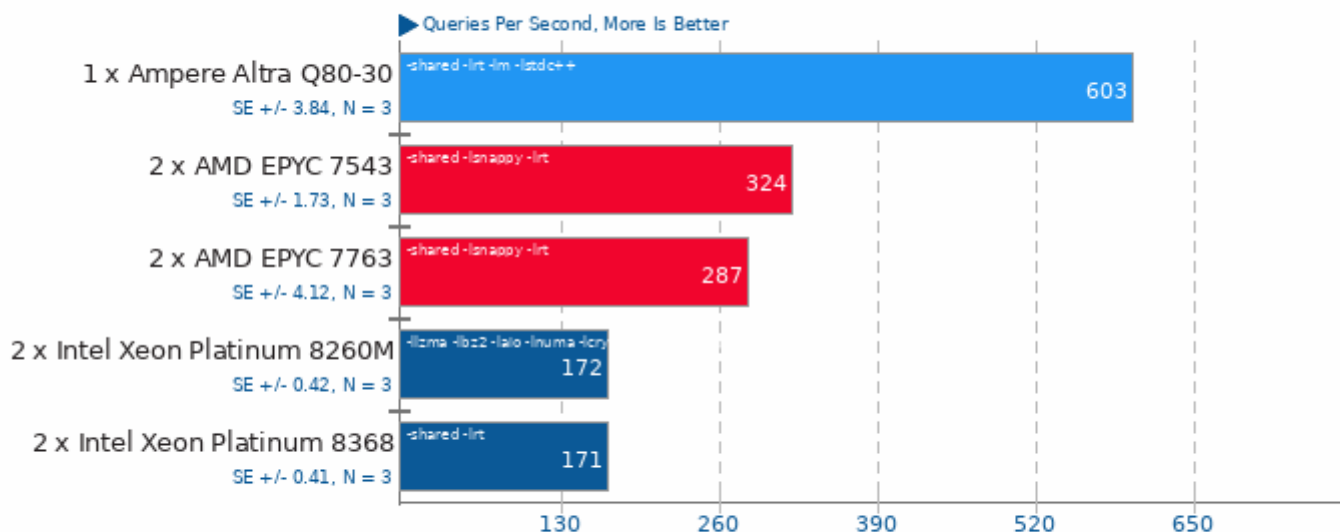
Clients: 128



1. (CXX) g++ options: -fPIC -pie -fstack-protector -O2 -lpthread -lz -ldl

MariaDB 10.5.2

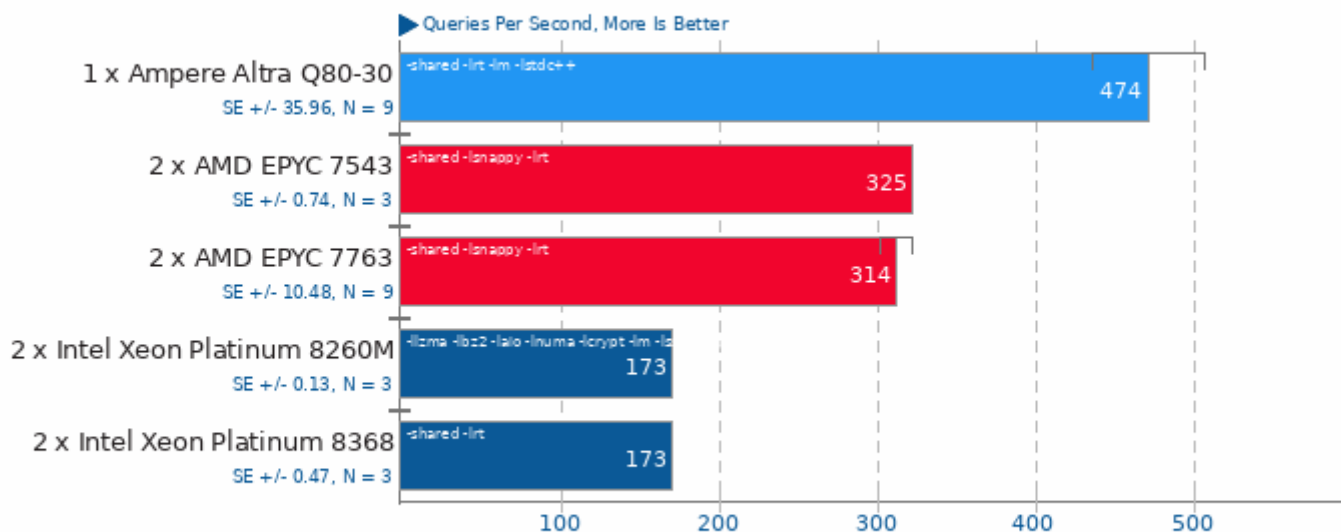
Clients: 256



1. (CXX) g++ options: -fPIC -pie -fstack-protector -O2 -lpthread -lz -ldl

MariaDB 10.5.2

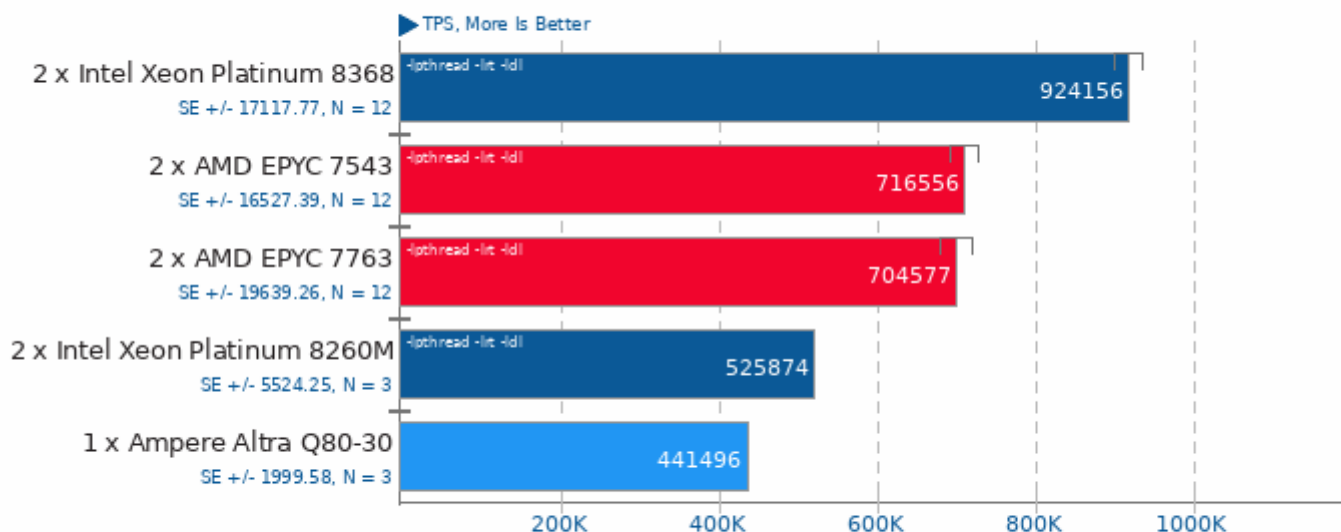
Clients: 512



1. (CXX) g++ options: -fPIC -pie -fstack-protector -O2 -lpthread -lz -ldl

PostgreSQL pgbench 13.0

Scaling Factor: 100 - Clients: 250 - Mode: Read Only



1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lm

PostgreSQL pgbench 13.0

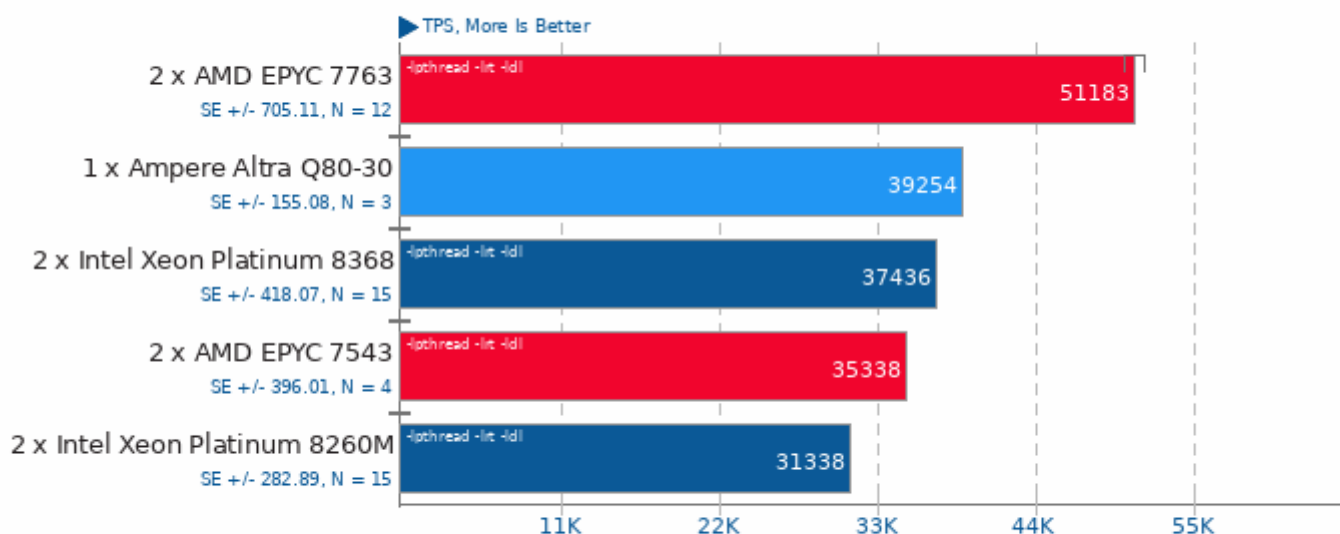
Scaling Factor: 100 - Clients: 250 - Mode: Read Only - Average Latency



1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lm

PostgreSQL pgbench 13.0

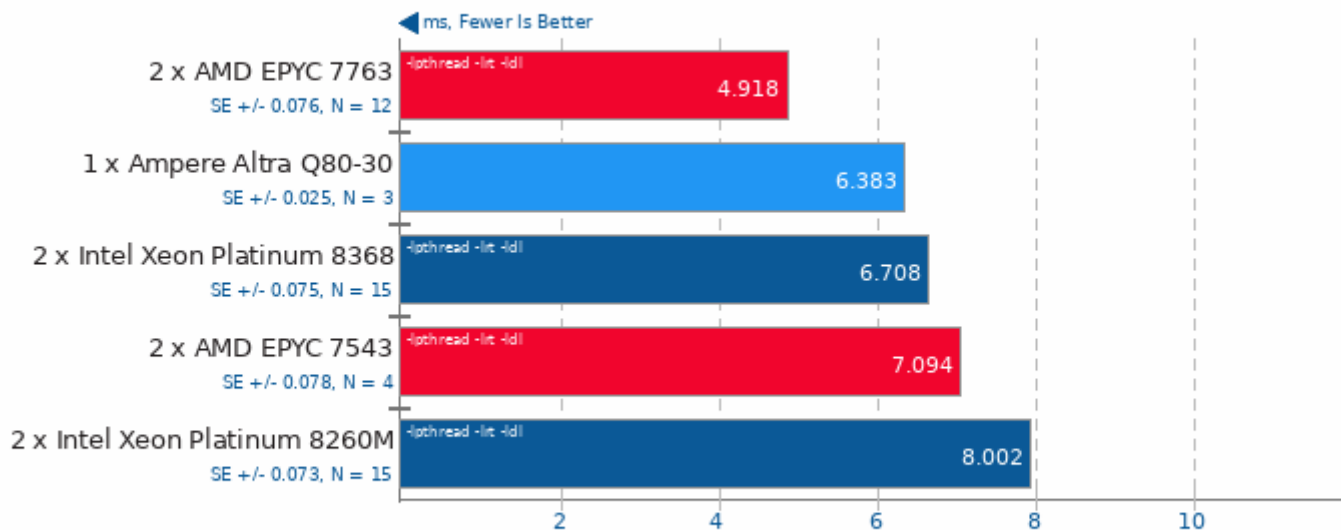
Scaling Factor: 100 - Clients: 250 - Mode: Read Write



1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lm

PostgreSQL pgbench 13.0

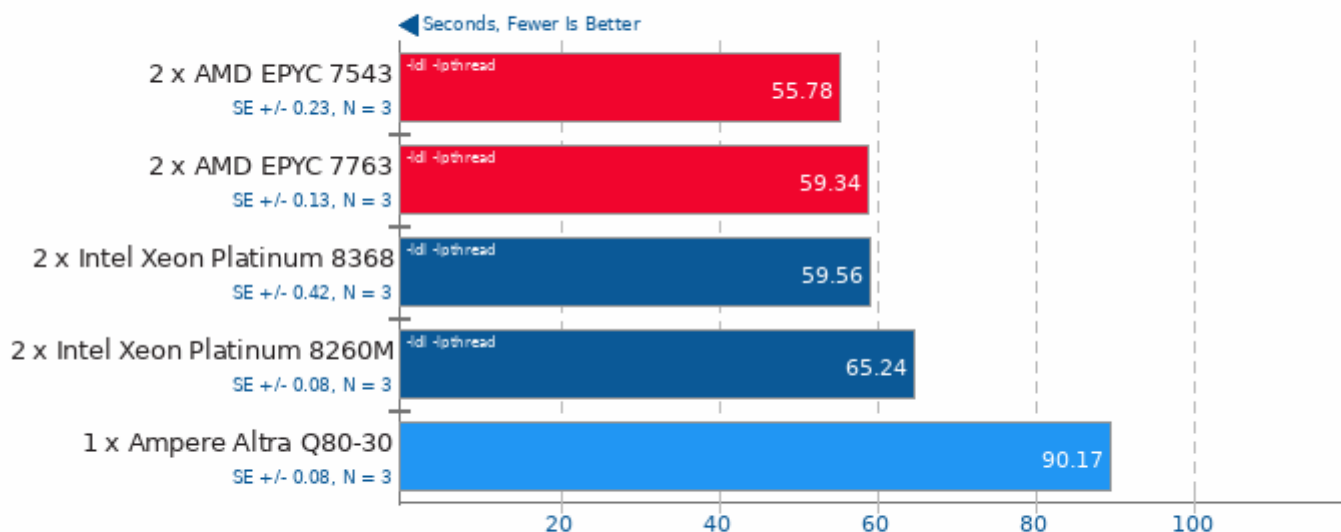
Scaling Factor: 100 - Clients: 250 - Mode: Read Write - Average Latency



1. (CC) gcc options: -fno-strict-aliasing -fwrapv -O2 -lpgcommon -lpgport -lpq -lm

SQLite Speedtest 3.30

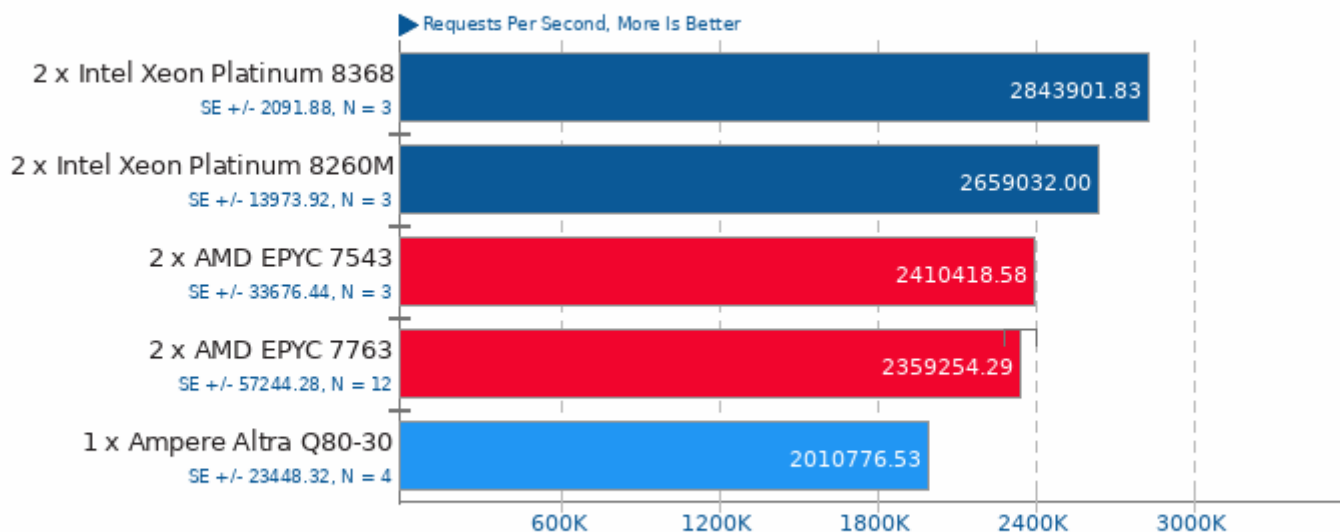
Timed Time - Size 1,000



1. (CC) gcc options: -O2 -lz

Redis 6.0.9

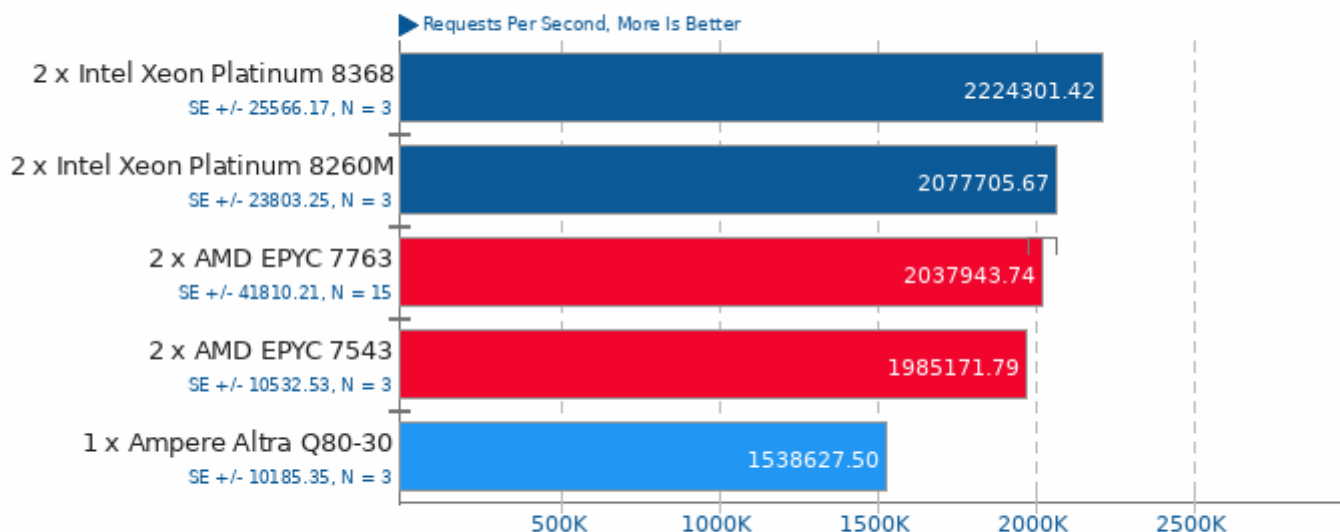
Test: LPOP



1. (CXX) g++ options: -MM -MT -g3 -fvisibility=hidden -O3

Redis 6.0.9

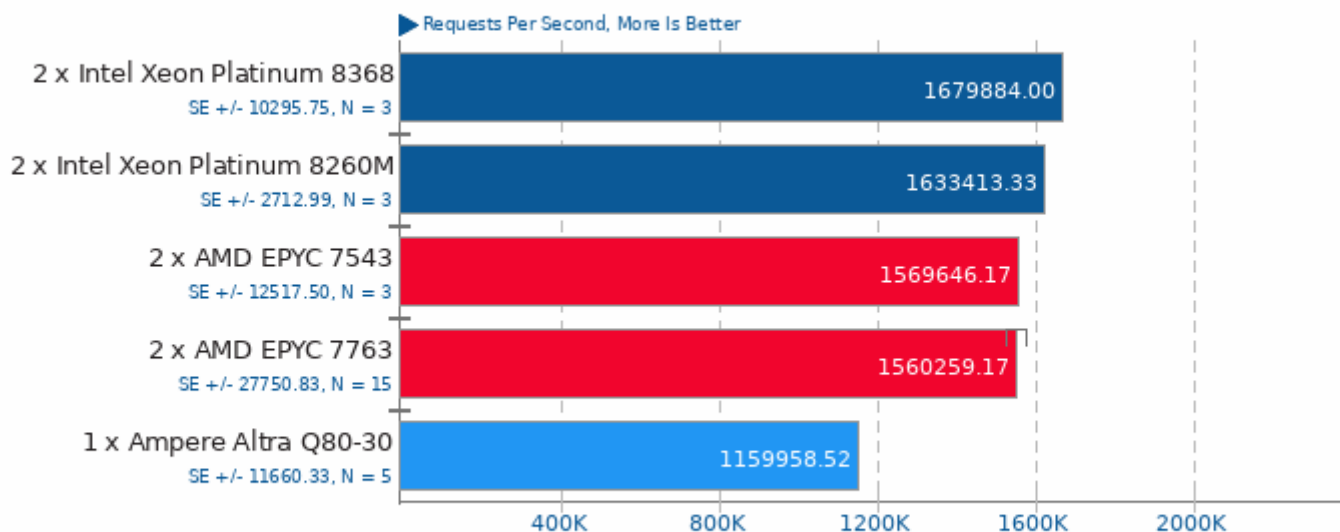
Test: SADD



1. (CXX) g++ options: -MM -MT -g3 -fvisibility=hidden -O3

Redis 6.0.9

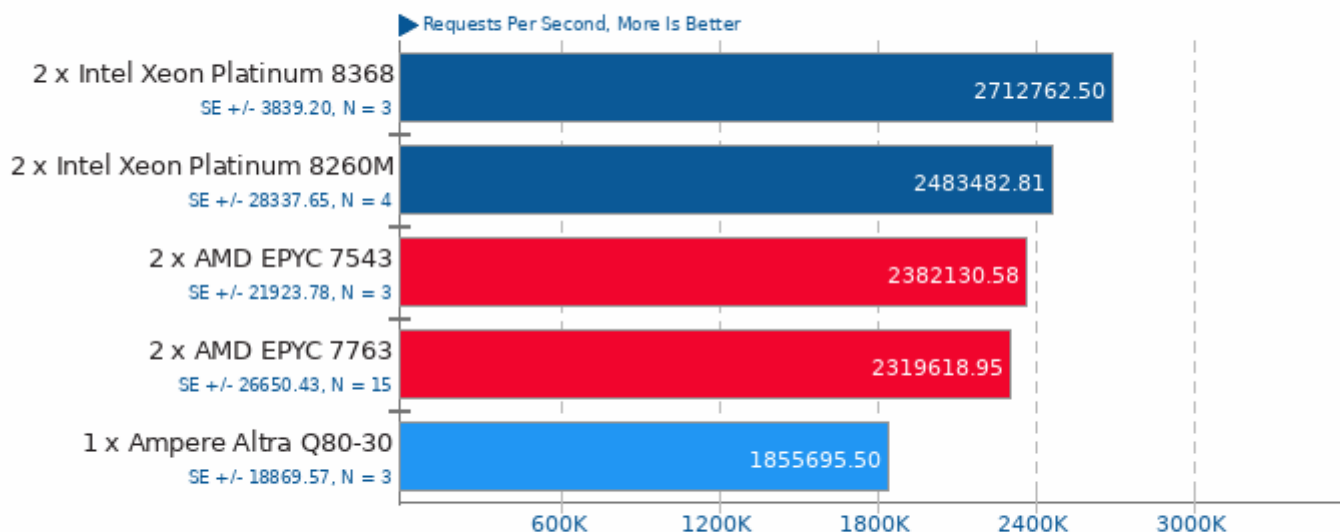
Test: LPUSH



1. (CXX) g++ options: -MM -MT -g3 -fvisibility=hidden -O3

Redis 6.0.9

Test: GET



1. (CXX) g++ options: -MM -MT -g3 -fvisibility=hidden -O3

Redis 6.0.9

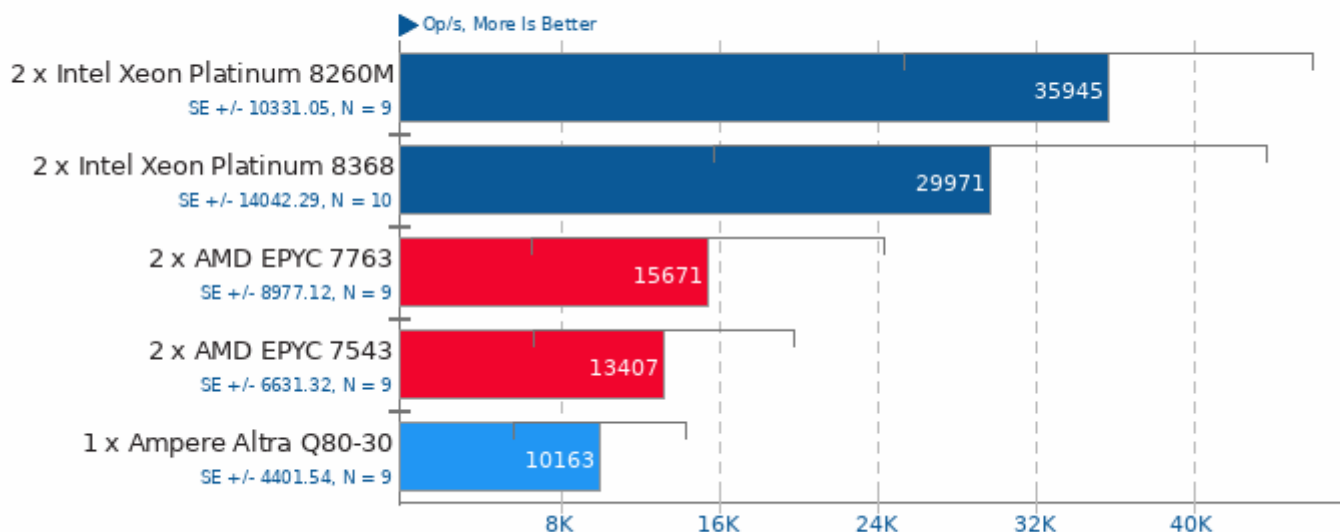
Test: SET



1. (CXX) g++ options: -MM-MT -g3 -fvisibility=hidden -O3

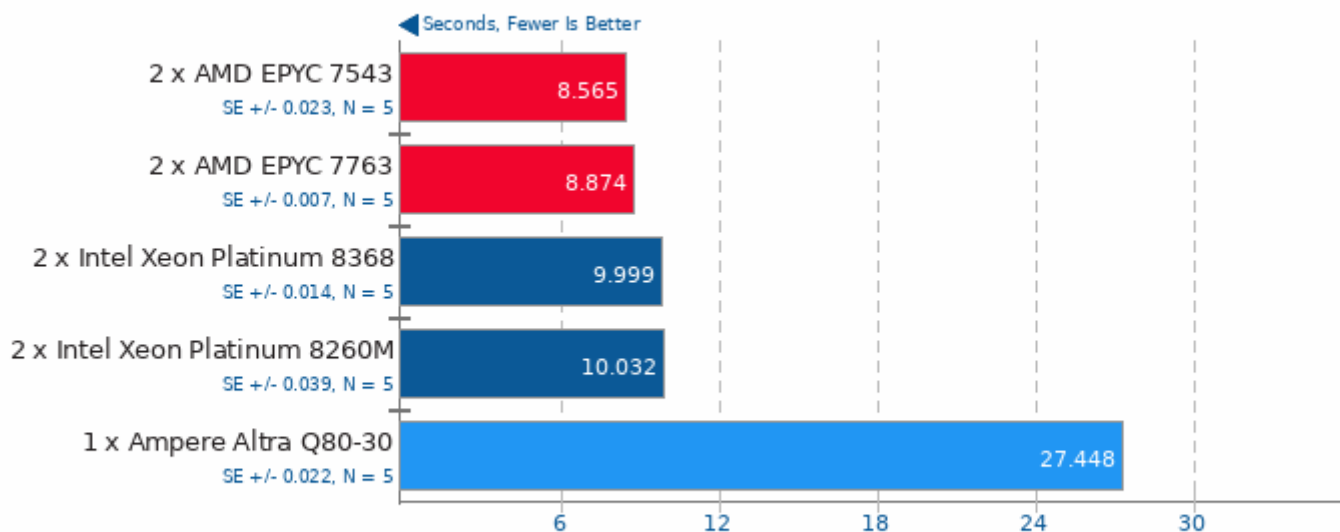
Apache Cassandra 3.11.4

Test: Mixed 1:3



FLAC Audio Encoding 1.3.2

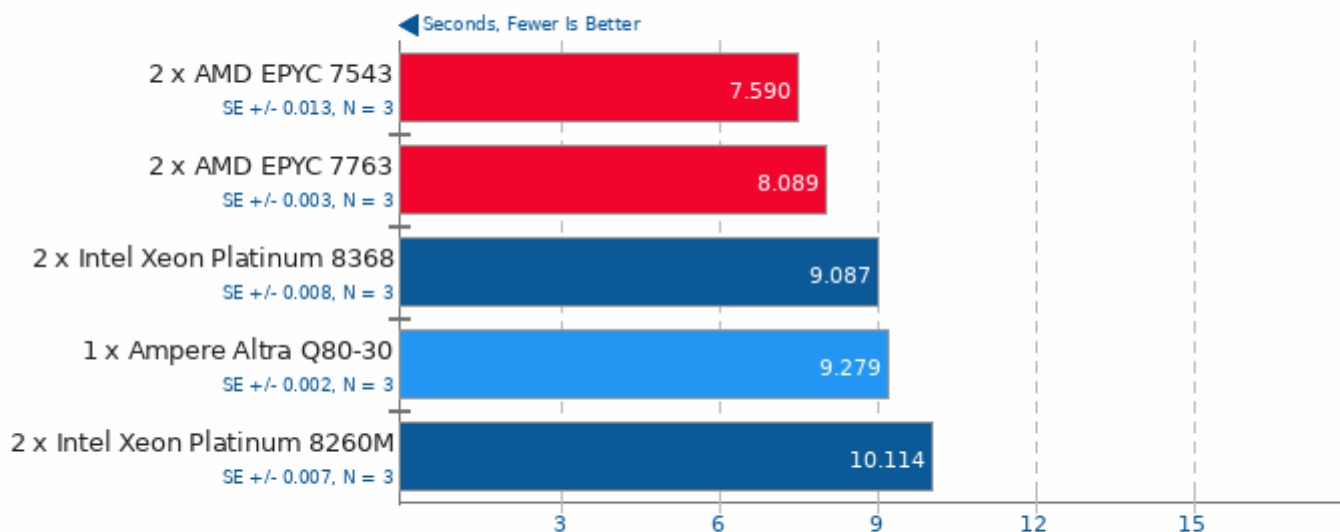
WAV To FLAC



1. (CXX) g++ options: -O2 -fvisibility=hidden -lm

LAME MP3 Encoding 3.100

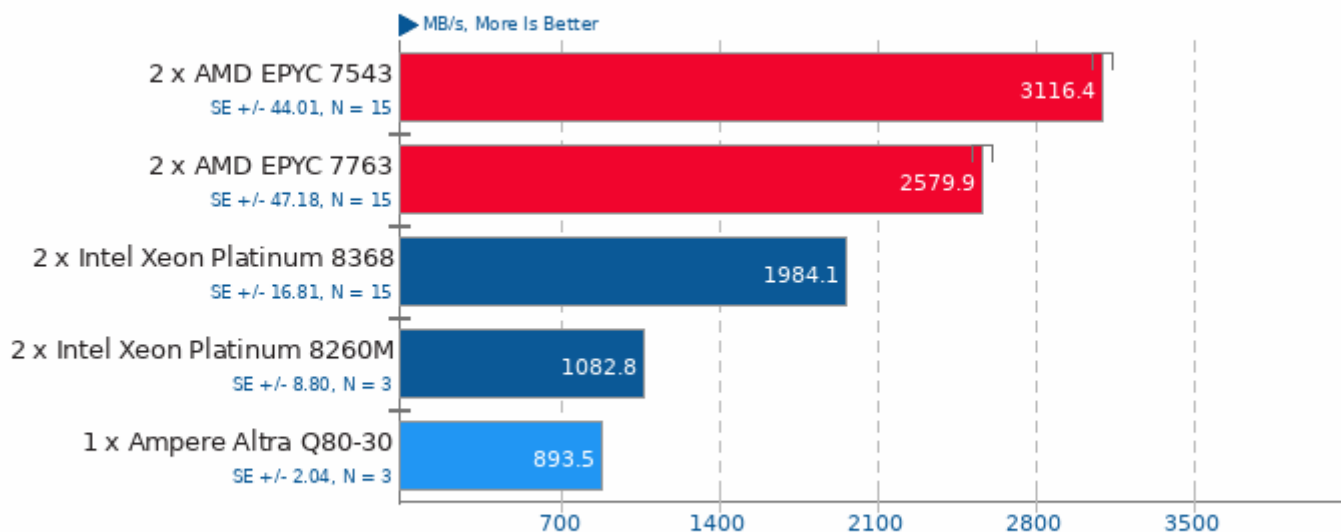
WAV To MP3



1. (CC) gcc options: -O3 -ffast-math -funroll-loops -fschedule-insns2 -fbranch-count-reg -fforce-addr-pipe -Incurses -lm

Zstd Compression 1.4.9

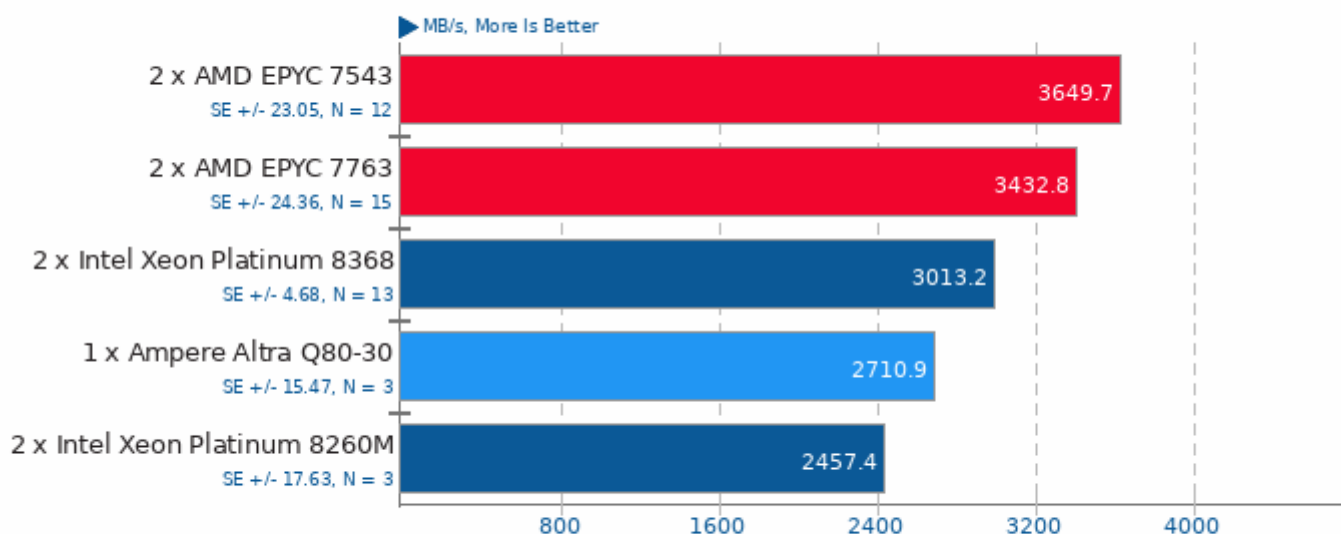
Compression Level: 8 - Compression Speed



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

Zstd Compression 1.4.9

Compression Level: 8 - Decompression Speed



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

dav1d 0.8.2

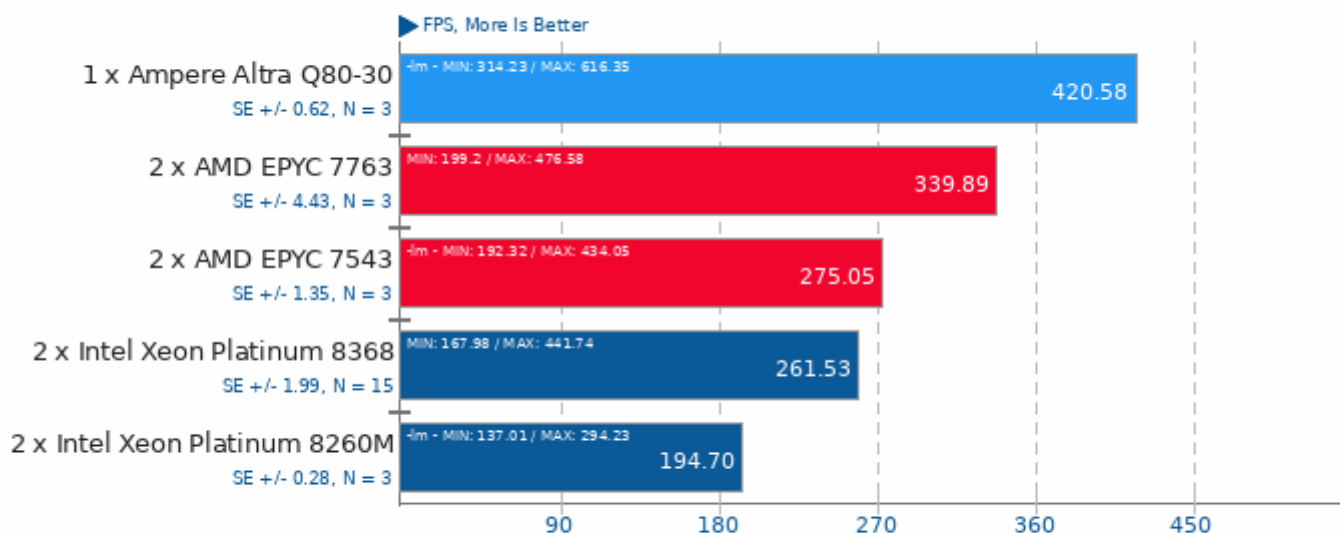
Video Input: Chimera 1080p



1. (CC) gcc options: -pthread

dav1d 0.8.2

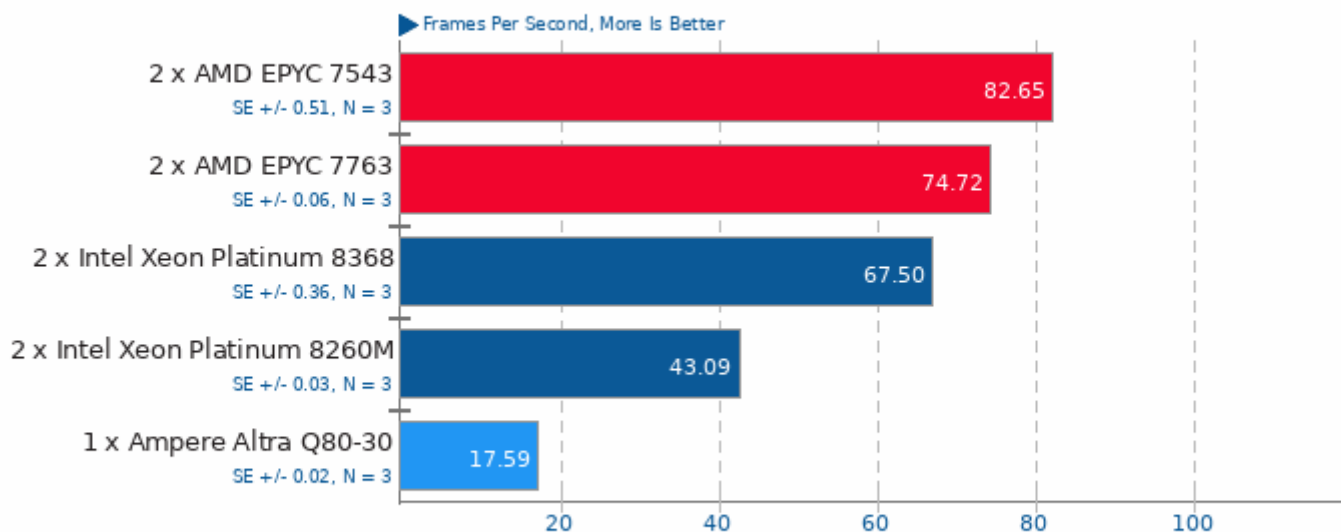
Video Input: Chimera 1080p 10-bit



1. (CC) gcc options: -pthread

Kvazaar 2.0

Video Input: Bosphorus 1080p - Video Preset: Medium



1. (CC) gcc options: -pthread -ftree-vectorize -fvisibility=hidden -O2 -lpthread -lm -lrt

x264 2019-12-17

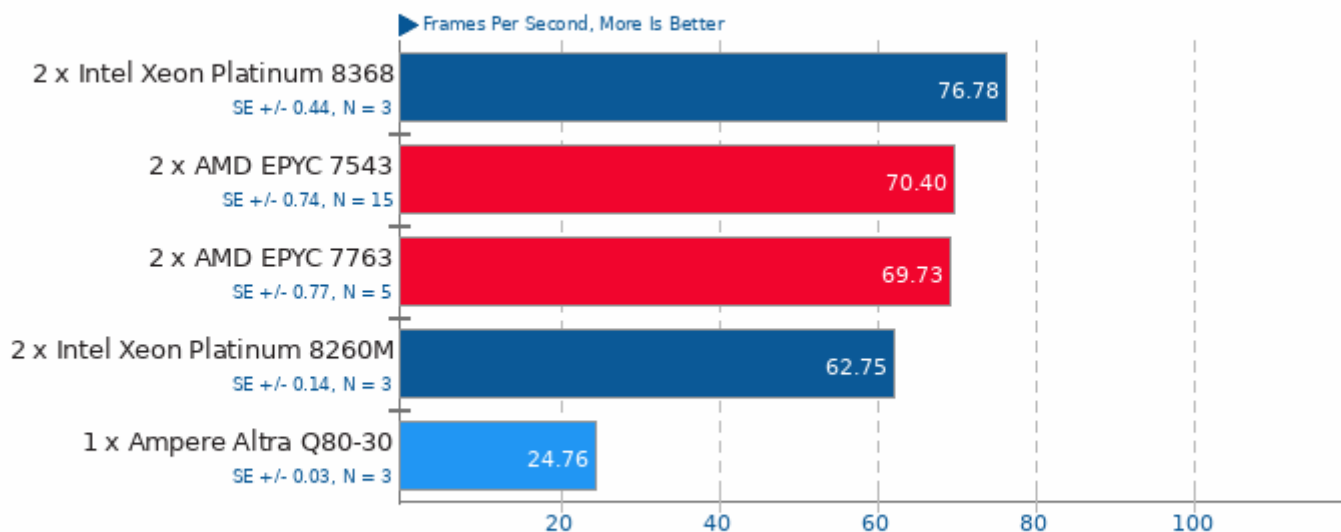
H.264 Video Encoding



1. (CC) gcc options: -ldl -lm -lpthread

x265 3.4

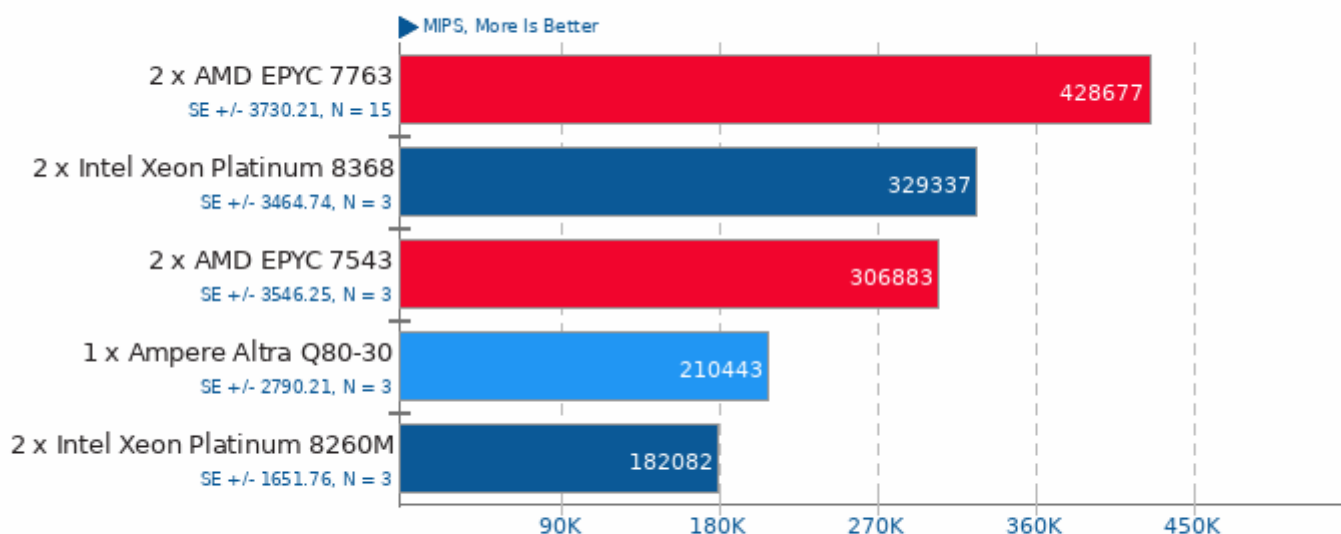
Video Input: Bosphorus 1080p



1. (CXX) g++ options: -O3 -rdynamic -lpthread -lrt -ldl -lnuma

7-Zip Compression 16.02

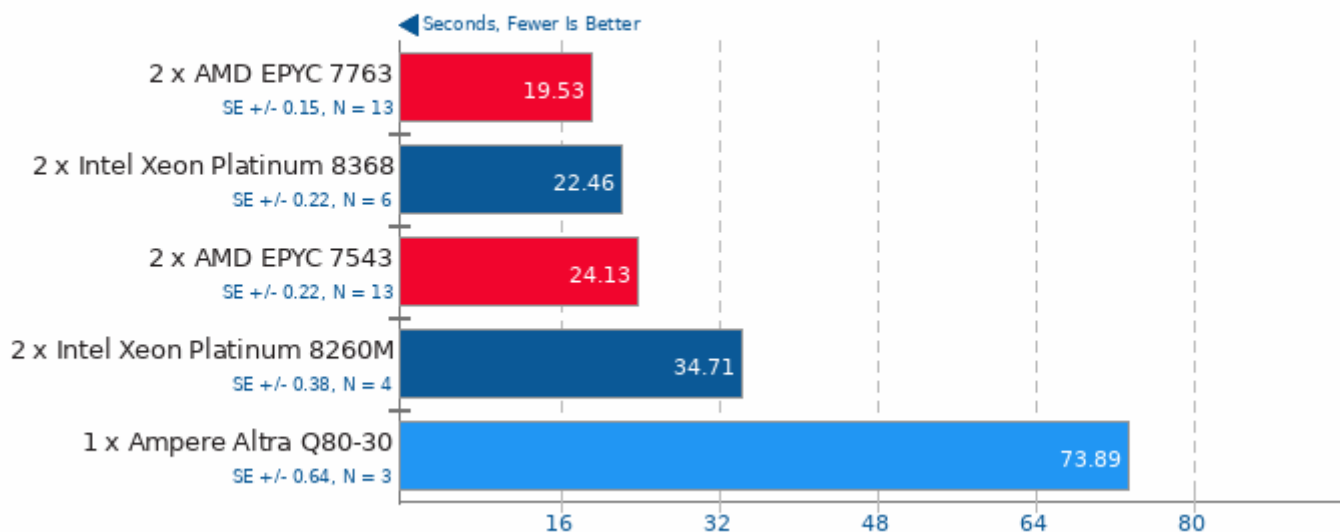
Compress Speed Test



1. (CXX) g++ options: -pipe -lpthread

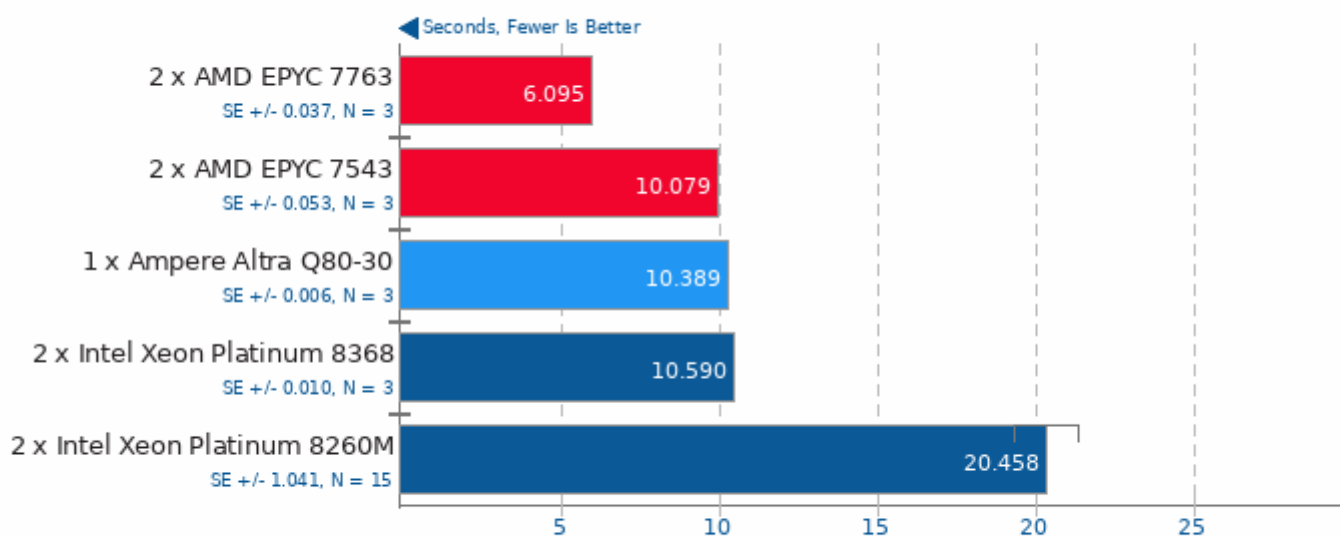
Timed Linux Kernel Compilation 5.10.20

Time To Compile



C-Ray 1.1

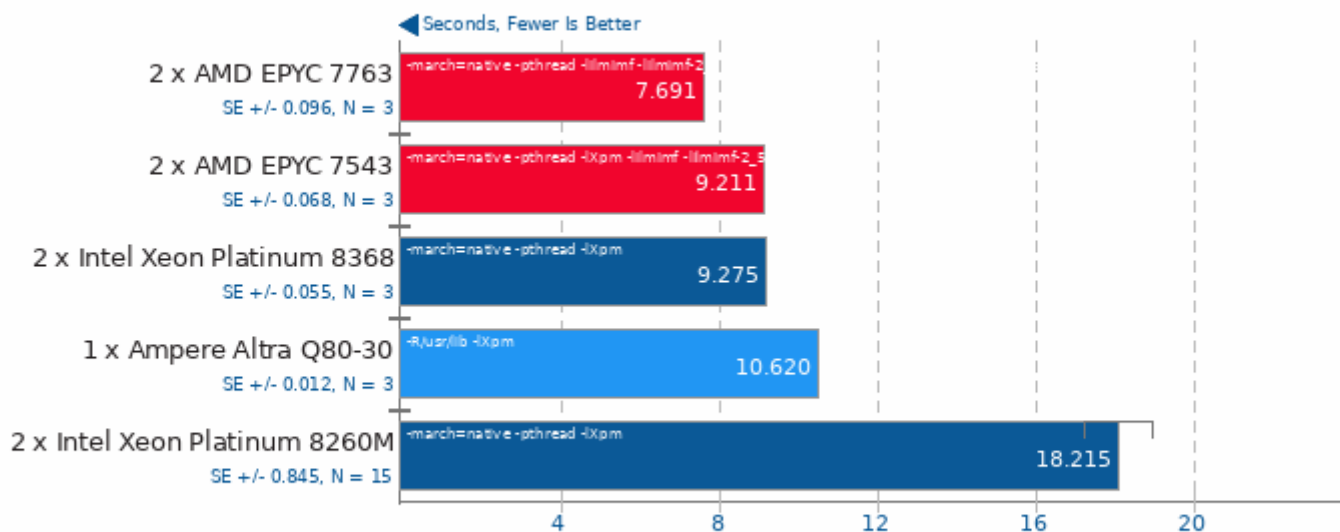
Total Time - 4K, 16 Rays Per Pixel



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

POV-Ray 3.7.0.7

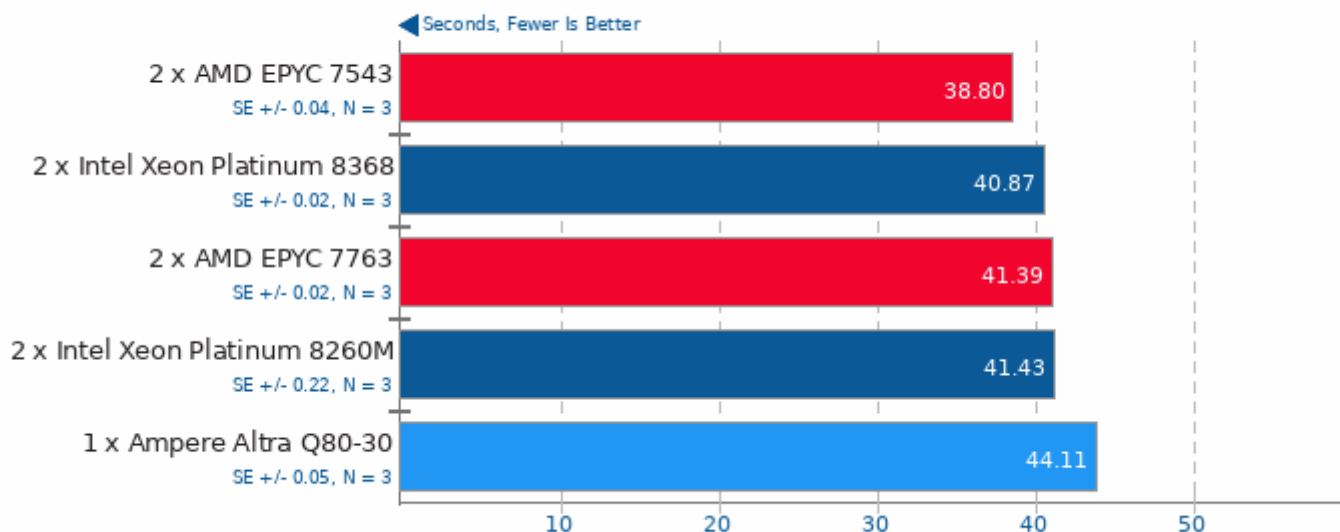
Trace Time



1. (CXX) g++ options: -pipe -O3 -ffast-math -lSM -lICE -lX11 -ltiff -ljpeg -lpng -lz -lrt -lm -lboost_thread -lboost_system

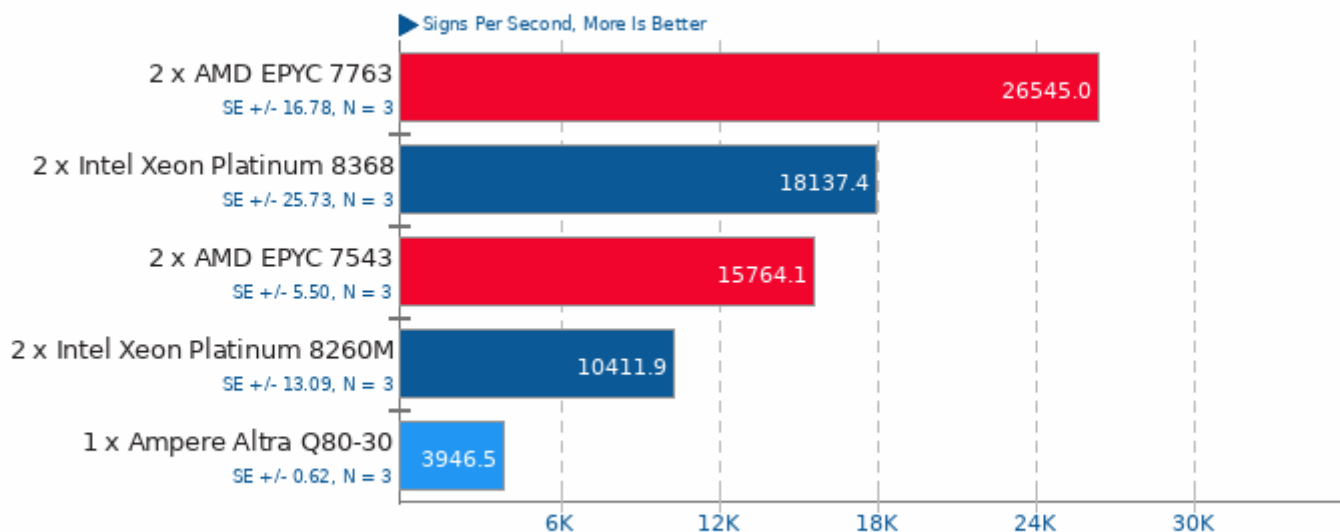
Gzip Compression

Linux Source Tree Archiving To .tar.gz



OpenSSL 1.1.1

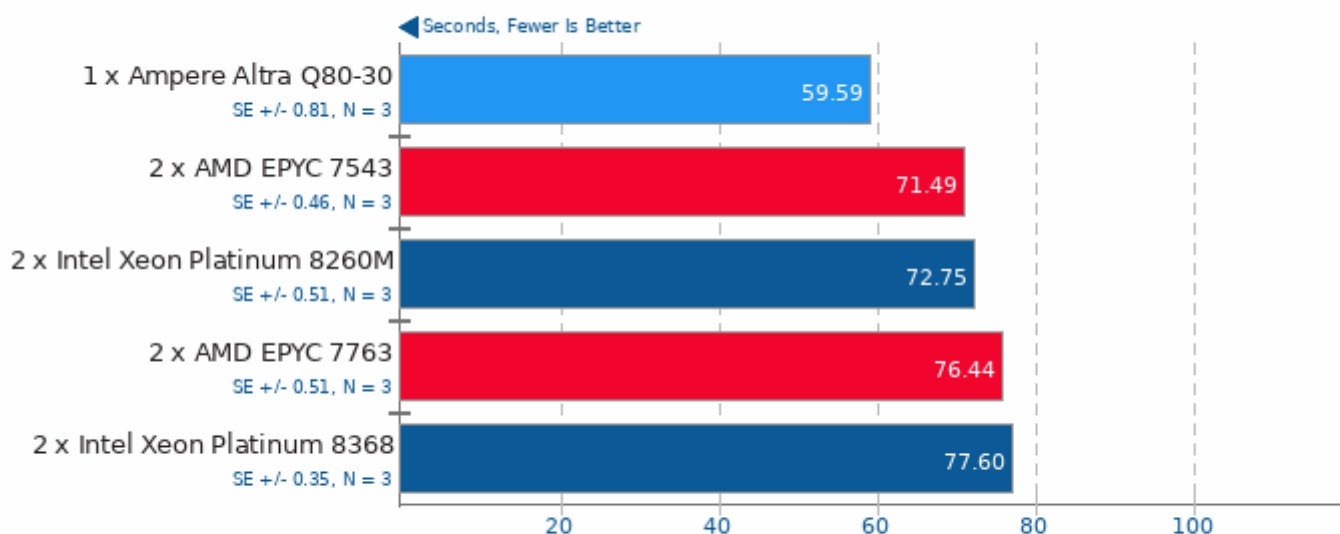
RSA 4096-bit Performance



1. (CC) gcc options: -pthread -m64 -O3 -lssl -lcrypto -ldl

GnuPG 2.2.27

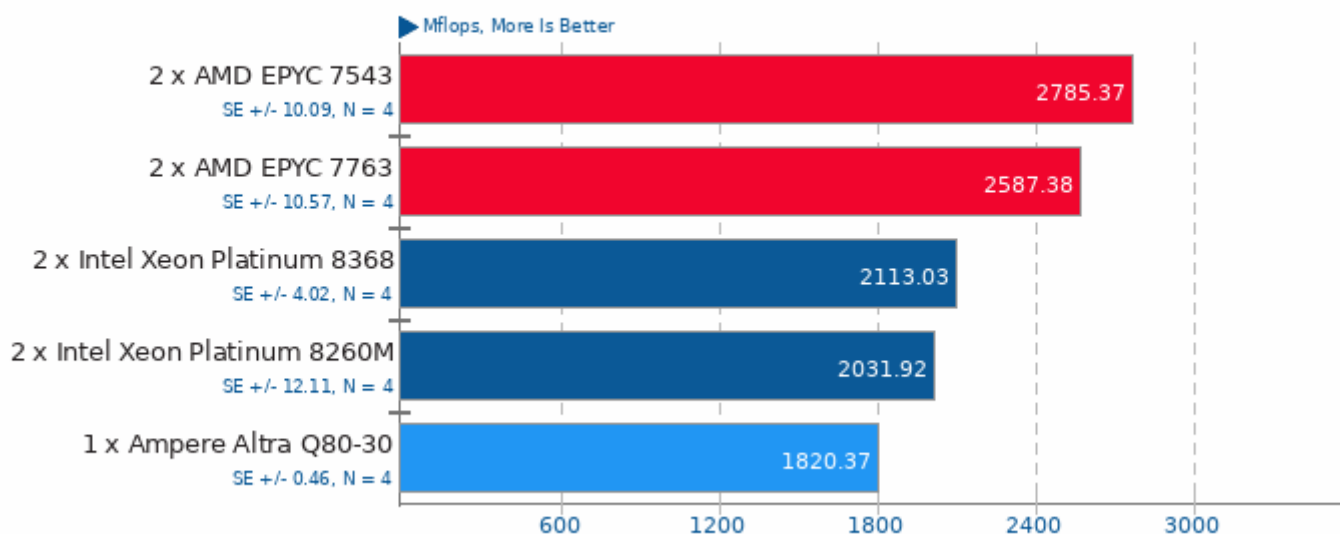
2.7GB Sample File Encryption



1. (CC) gcc options: -O2

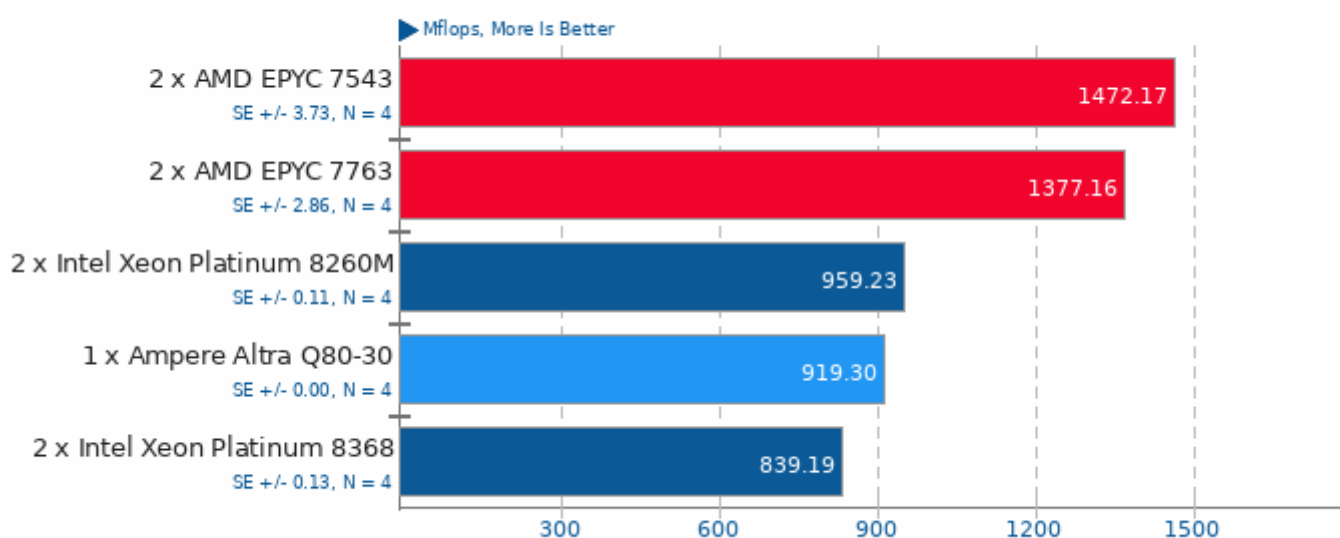
Java SciMark 2.0

Computational Test: Composite



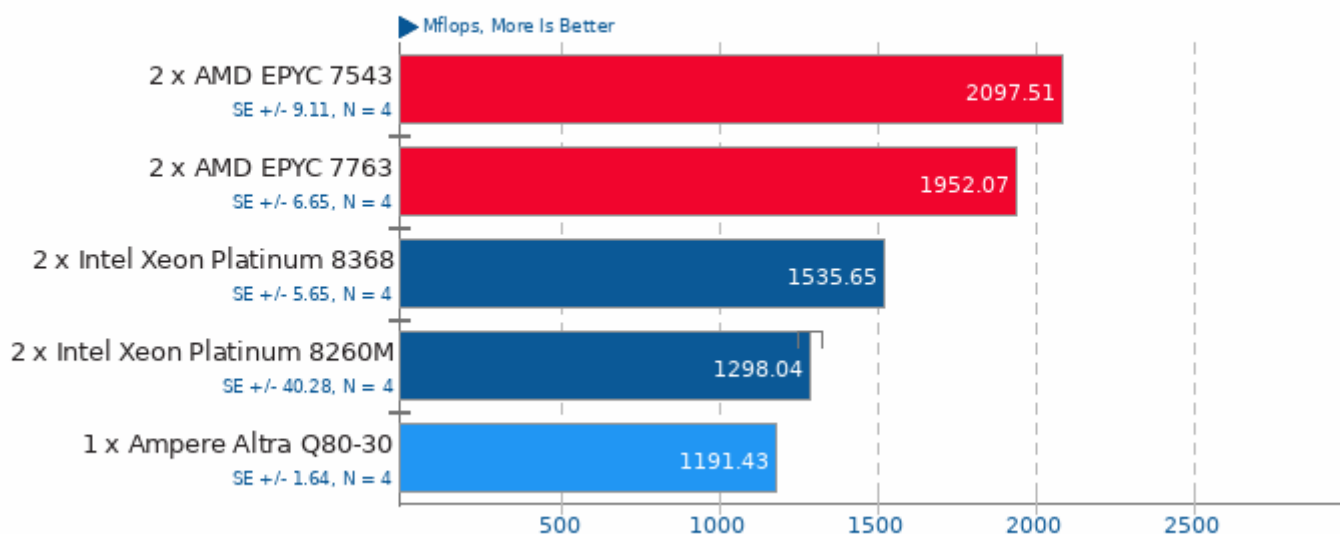
Java SciMark 2.0

Computational Test: Monte Carlo



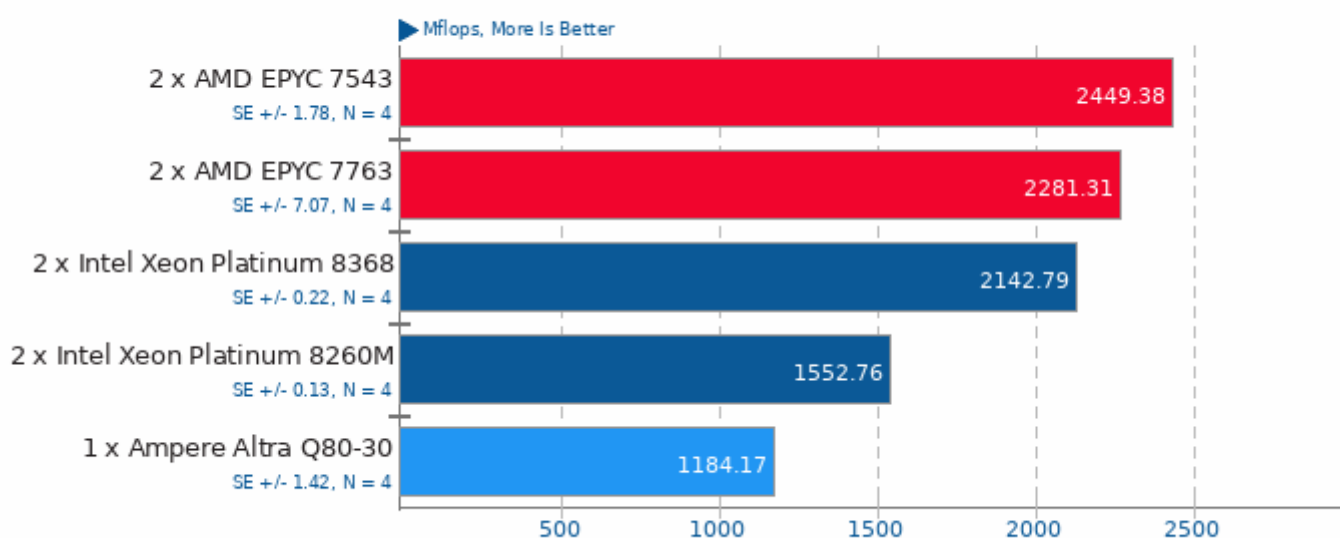
Java SciMark 2.0

Computational Test: Fast Fourier Transform



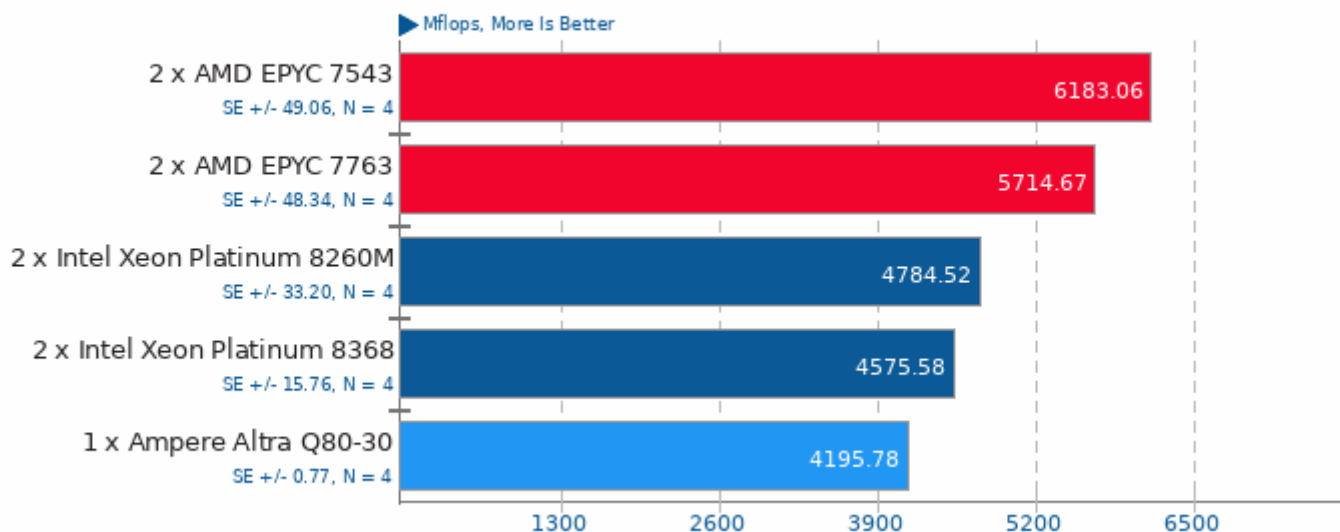
Java SciMark 2.0

Computational Test: Sparse Matrix Multiply



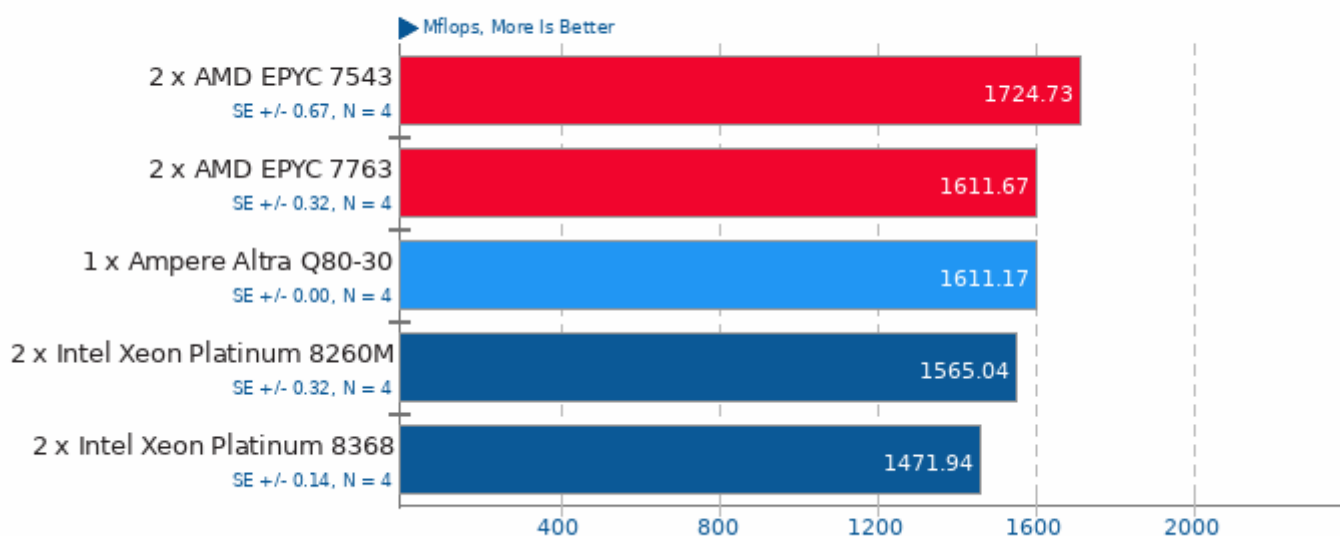
Java SciMark 2.0

Computational Test: Dense LU Matrix Factorization



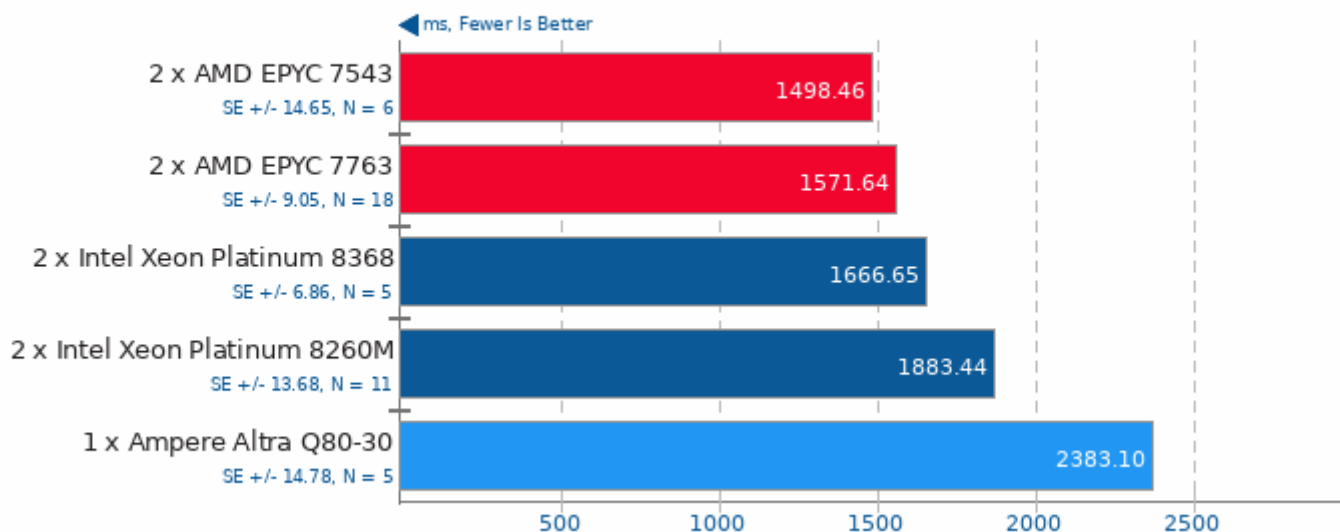
Java SciMark 2.0

Computational Test: Jacobi Successive Over-Relaxation



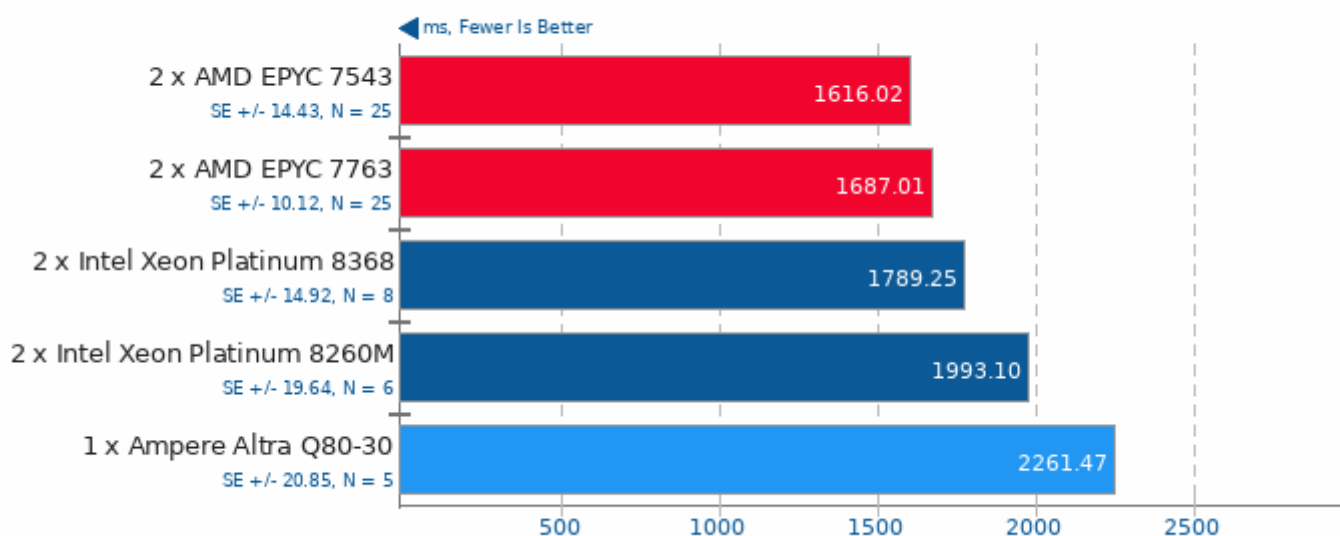
Renaissance 0.10.0

Test: Scala Dotty



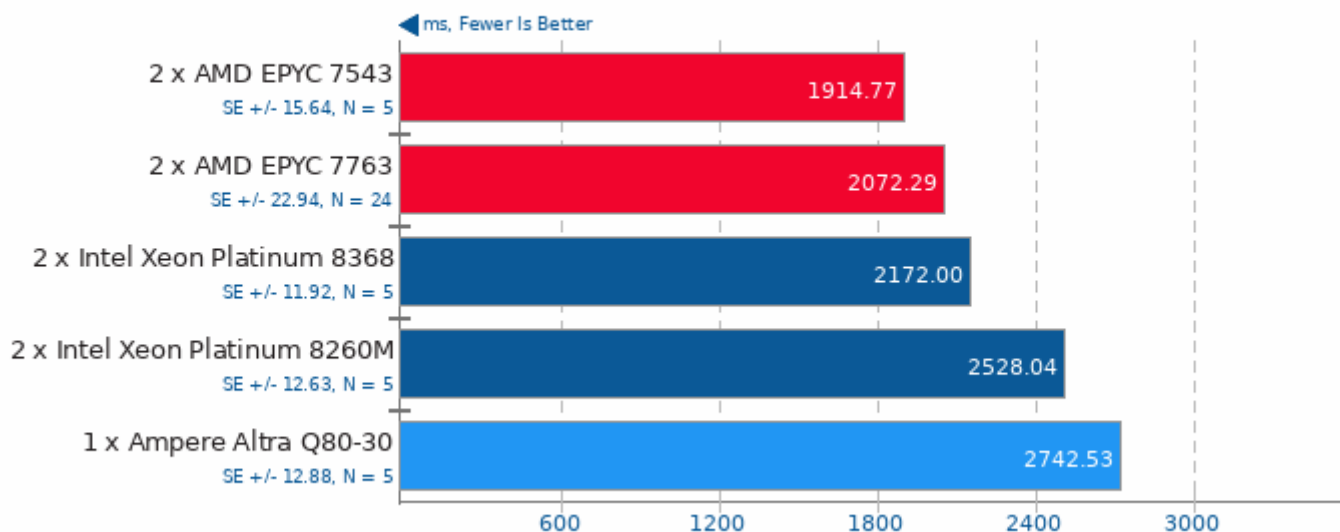
Renaissance 0.10.0

Test: Random Forest



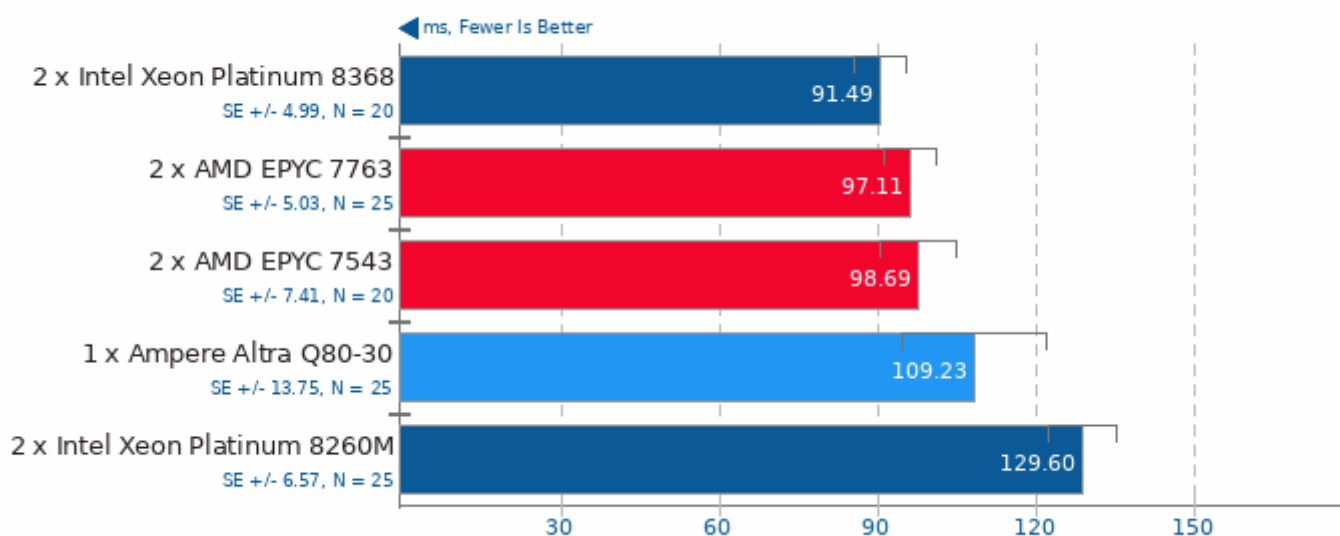
Renaissance 0.10.0

Test: Apache Spark ALS



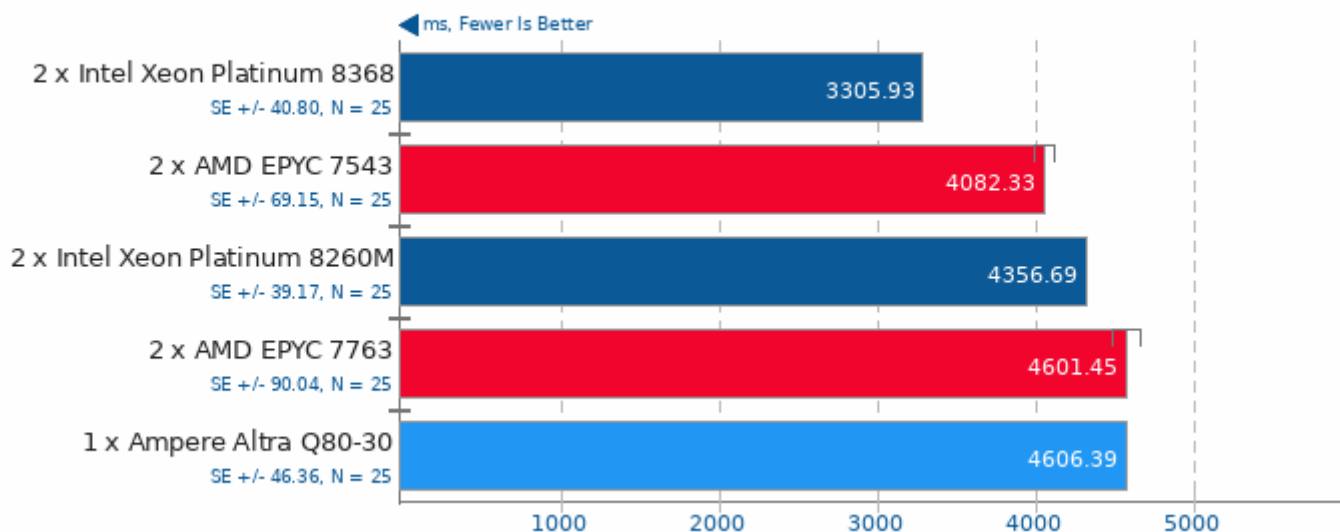
Renaissance 0.10.0

Test: Apache Spark Bayes



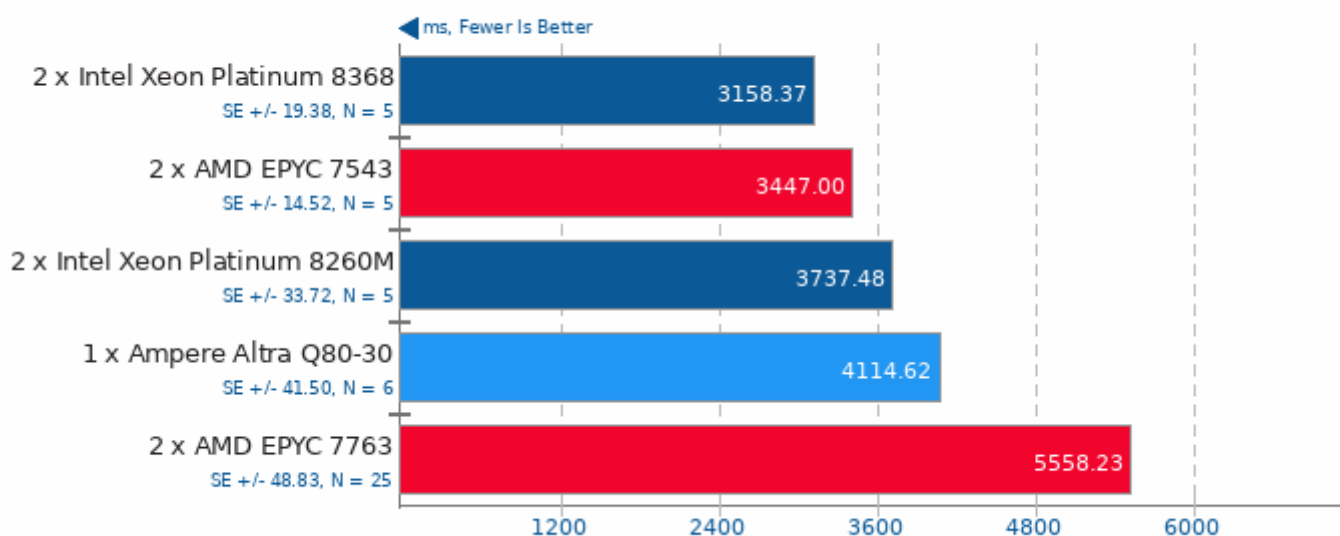
Renaissance 0.10.0

Test: Apache Spark PageRank



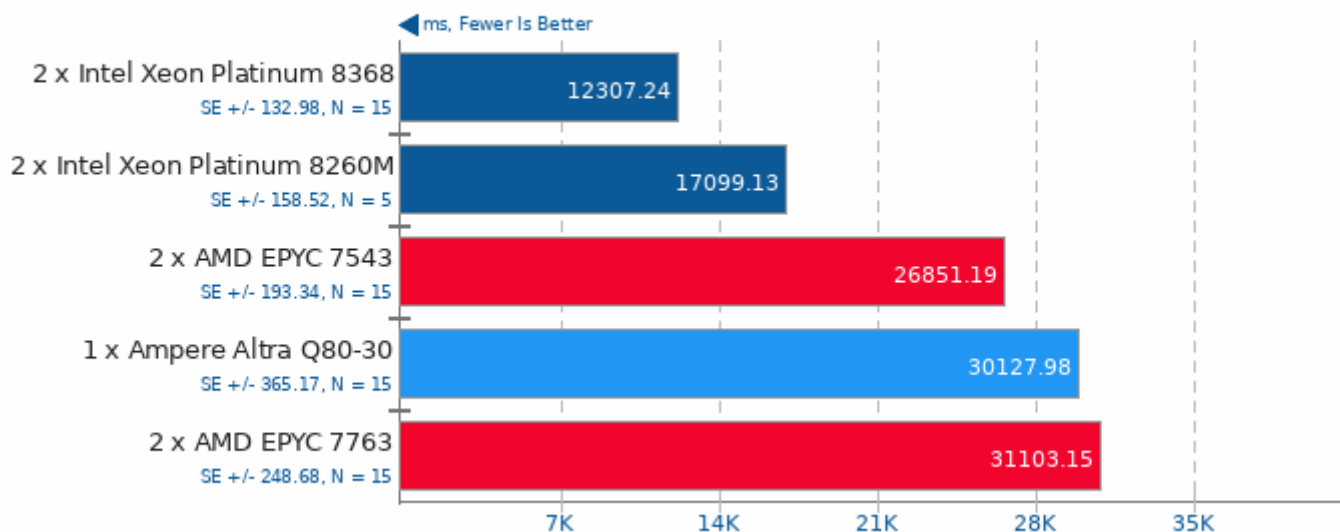
Renaissance 0.10.0

Test: Twitter HTTP Requests



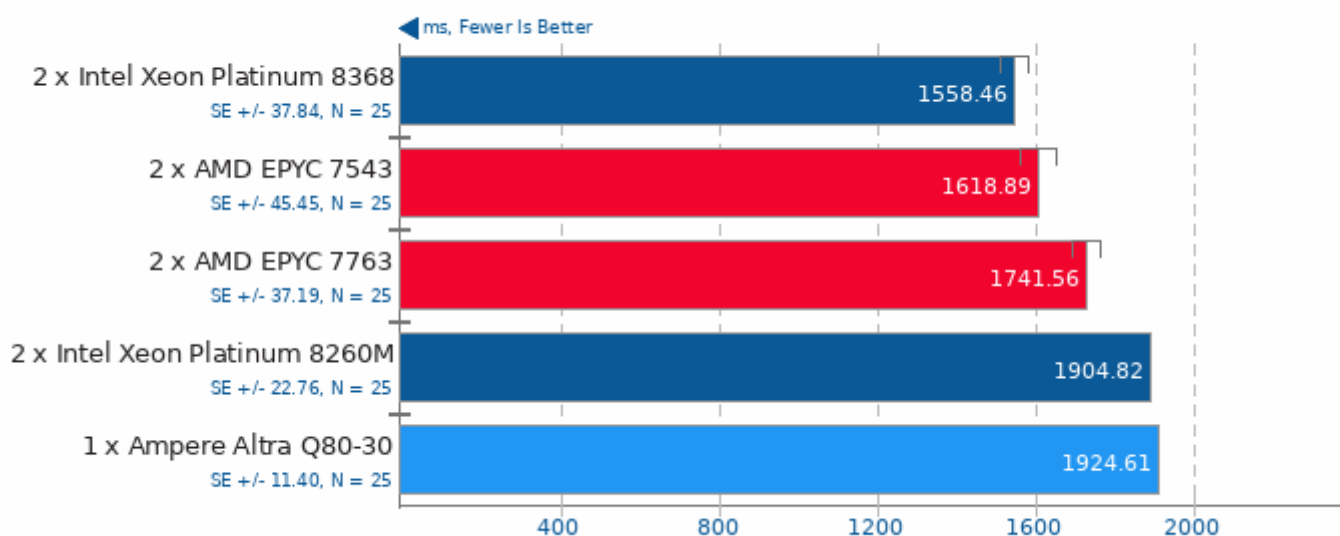
Renaissance 0.10.0

Test: Akka Unbalanced Cobwebbed Tree



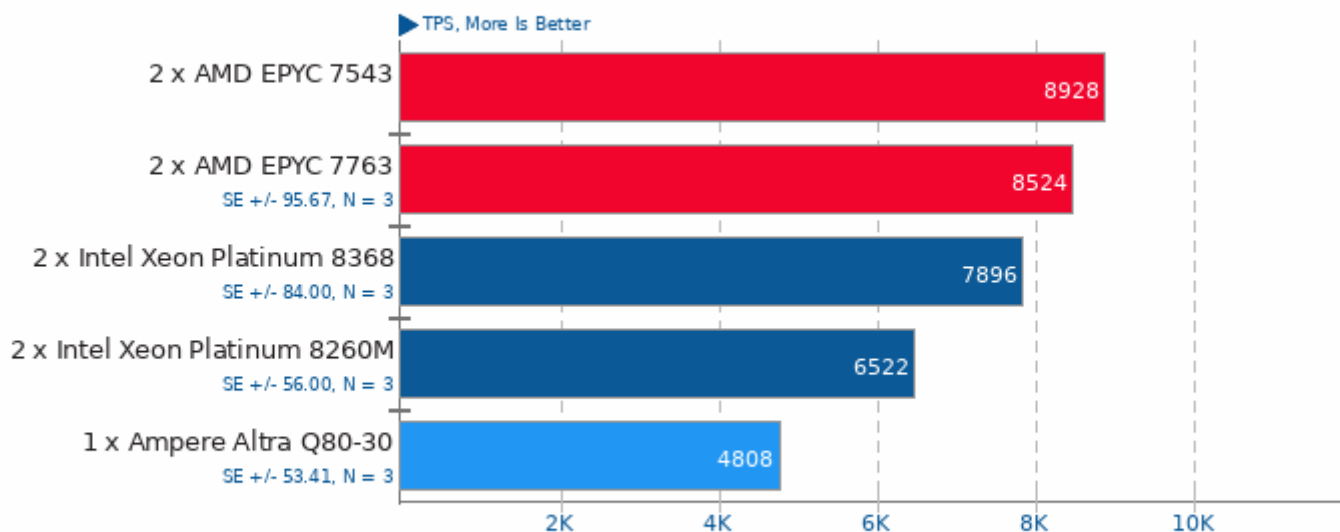
Renaissance 0.10.0

Test: Genetic Algorithm Using Jenetics + Futures



PostMark 1.51

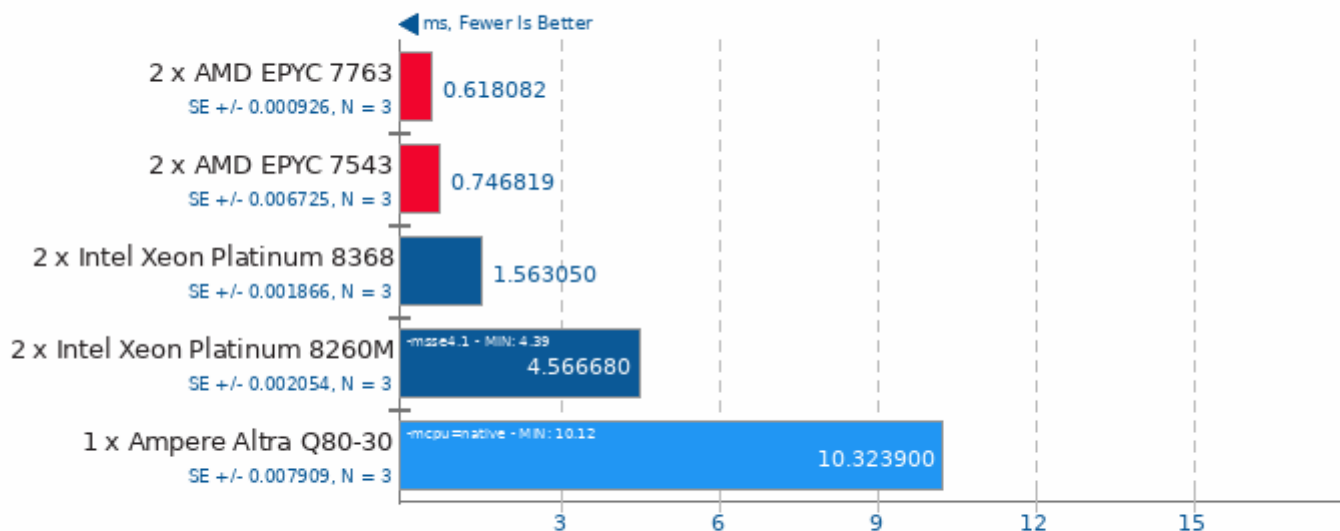
Disk Transaction Performance



1. (CC) gcc options: -O3

oneDNN 2.0

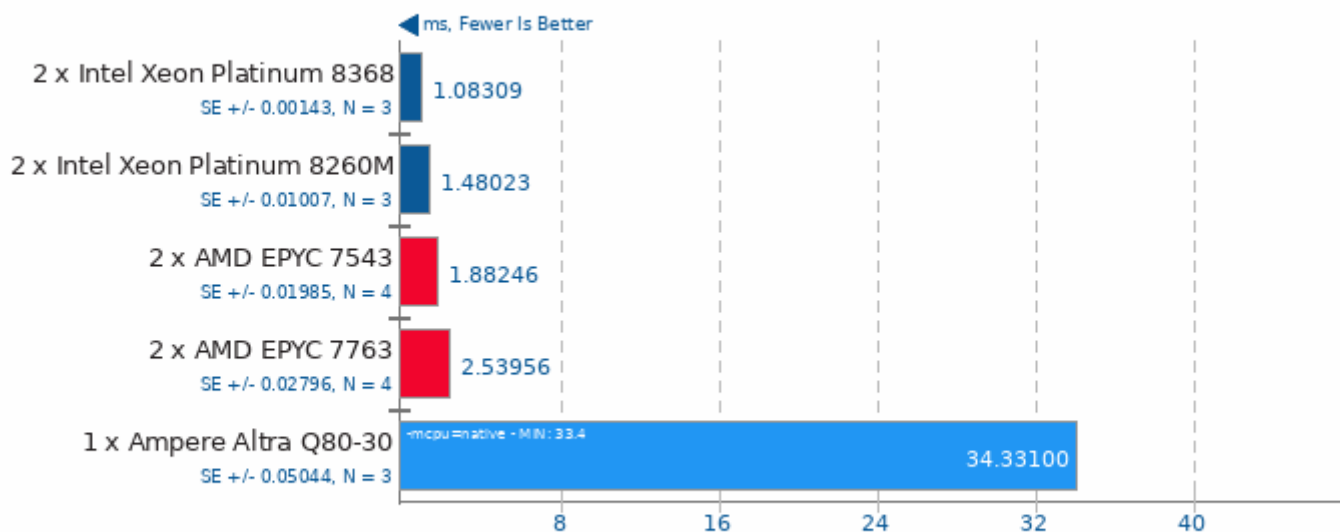
Harness: Convolution Batch Shapes Auto - Data Type: f32 - Engine: CPU



1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -fPIC -pie -lpthread

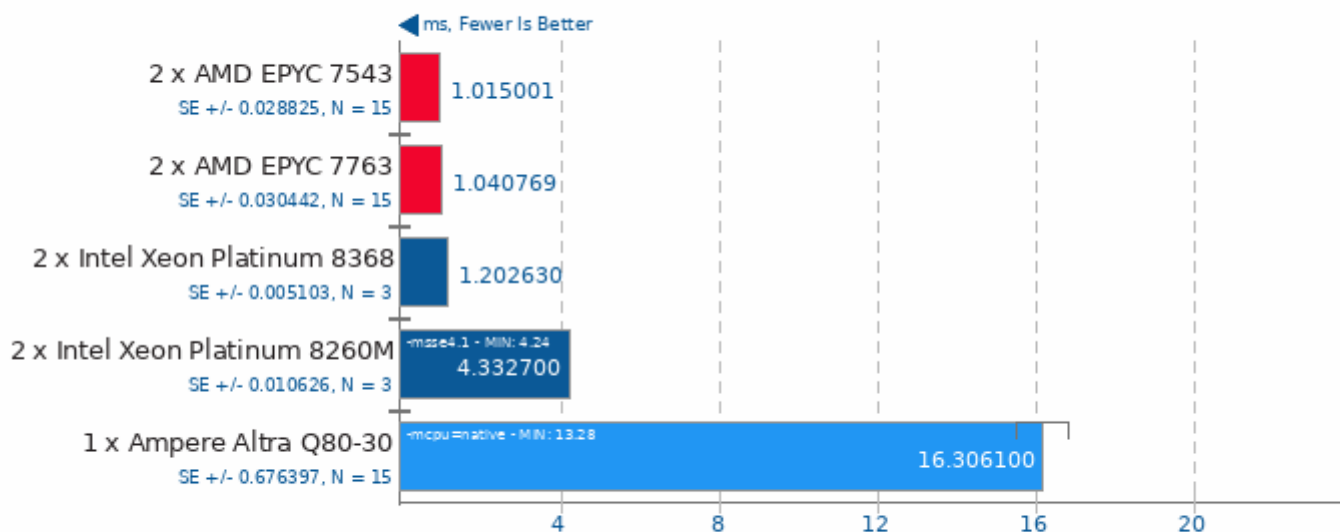
oneDNN 2.0

Harness: Deconvolution Batch shapes_1d - Data Type: f32 - Engine: CPU



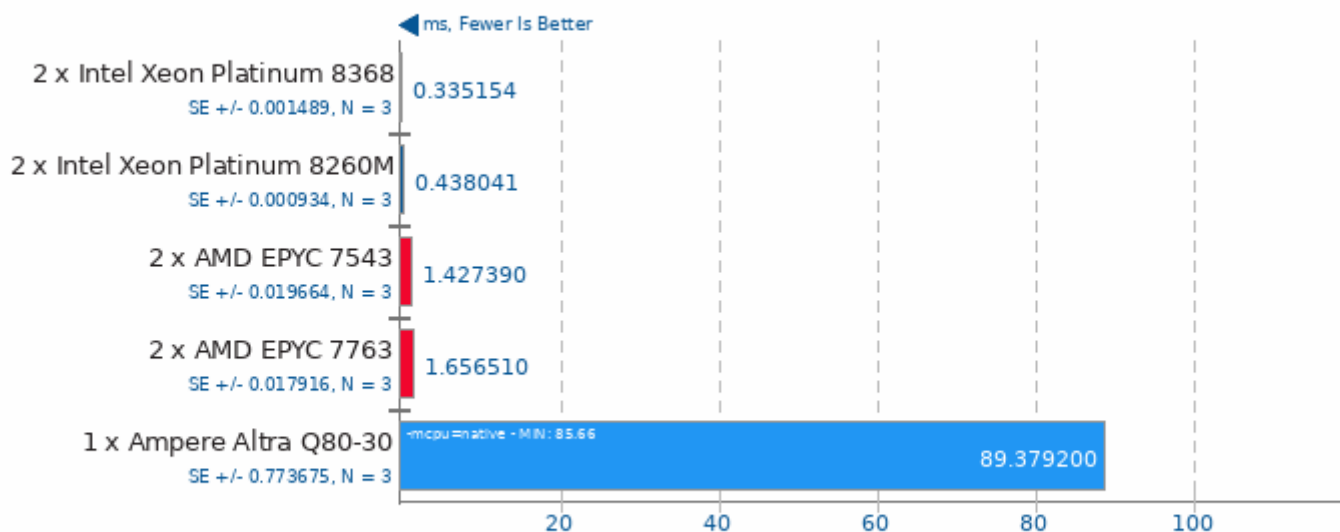
oneDNN 2.0

Harness: Convolution Batch Shapes Auto - Data Type: u8s8f32 - Engine: CPU



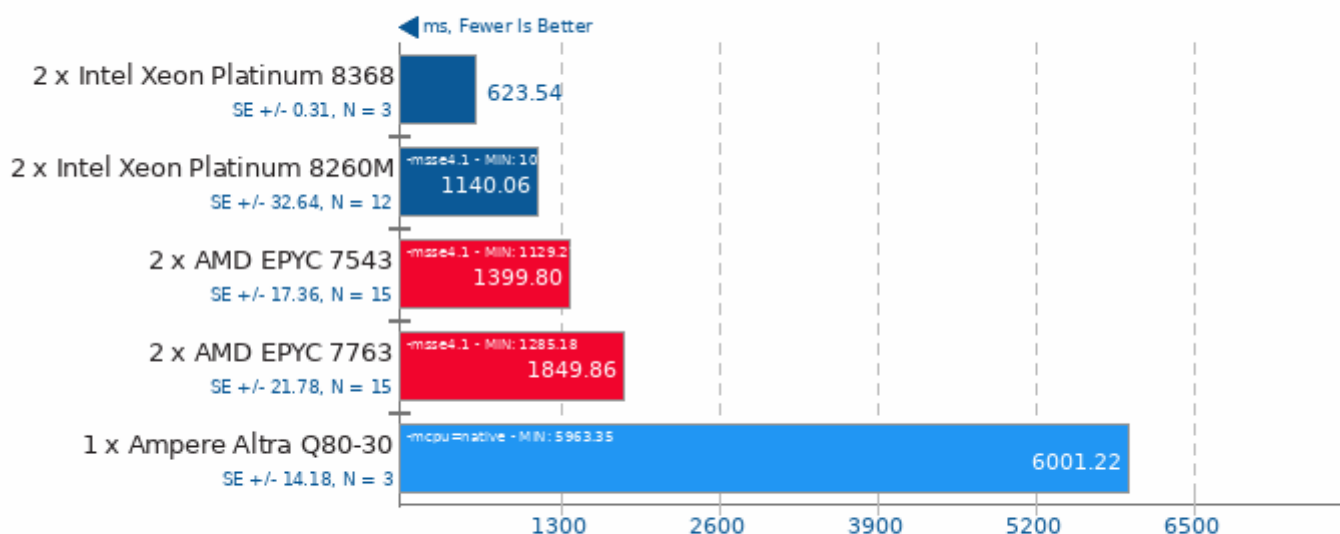
oneDNN 2.0

Harness: Deconvolution Batch shapes_1d - Data Type: u8s8f32 - Engine: CPU



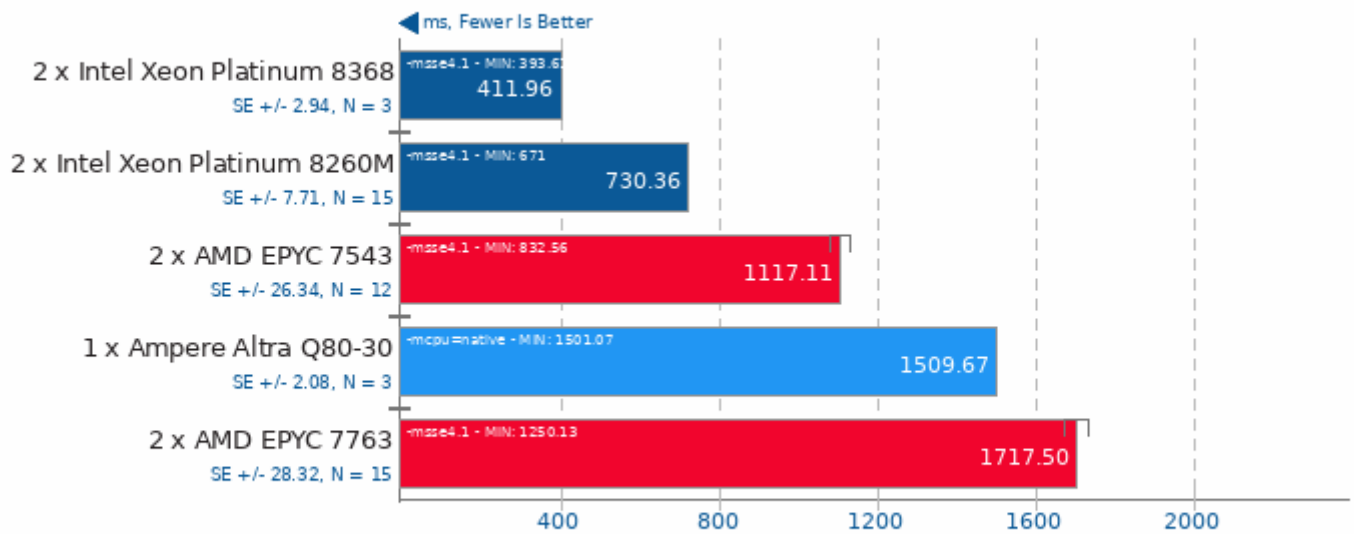
oneDNN 2.0

Harness: Recurrent Neural Network Training - Data Type: f32 - Engine: CPU



oneDNN 2.0

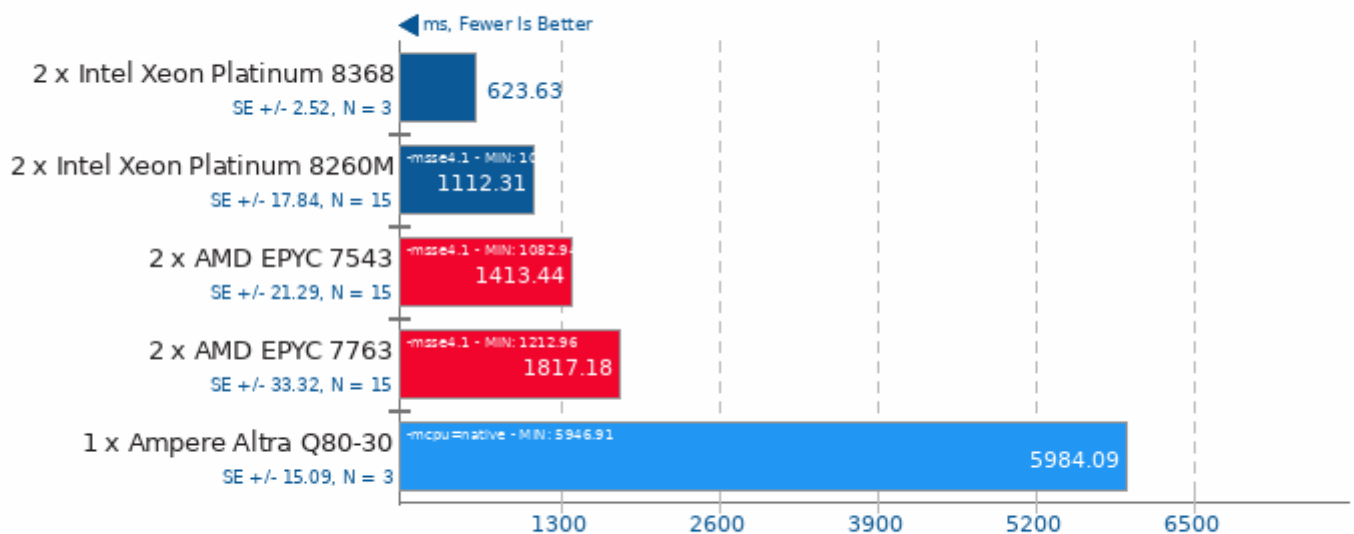
Harness: Recurrent Neural Network Inference - Data Type: f32 - Engine: CPU



1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -fpic -pie -lpthread

oneDNN 2.0

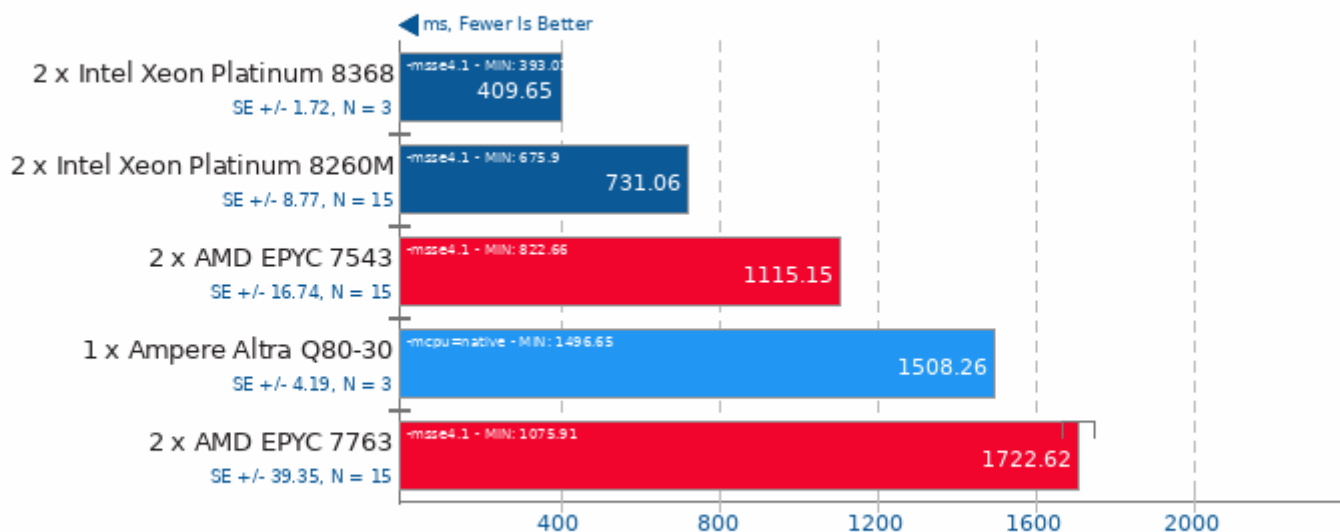
Harness: Recurrent Neural Network Training - Data Type: u8s8f32 - Engine: CPU



1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -fpic -pie -lpthread

oneDNN 2.0

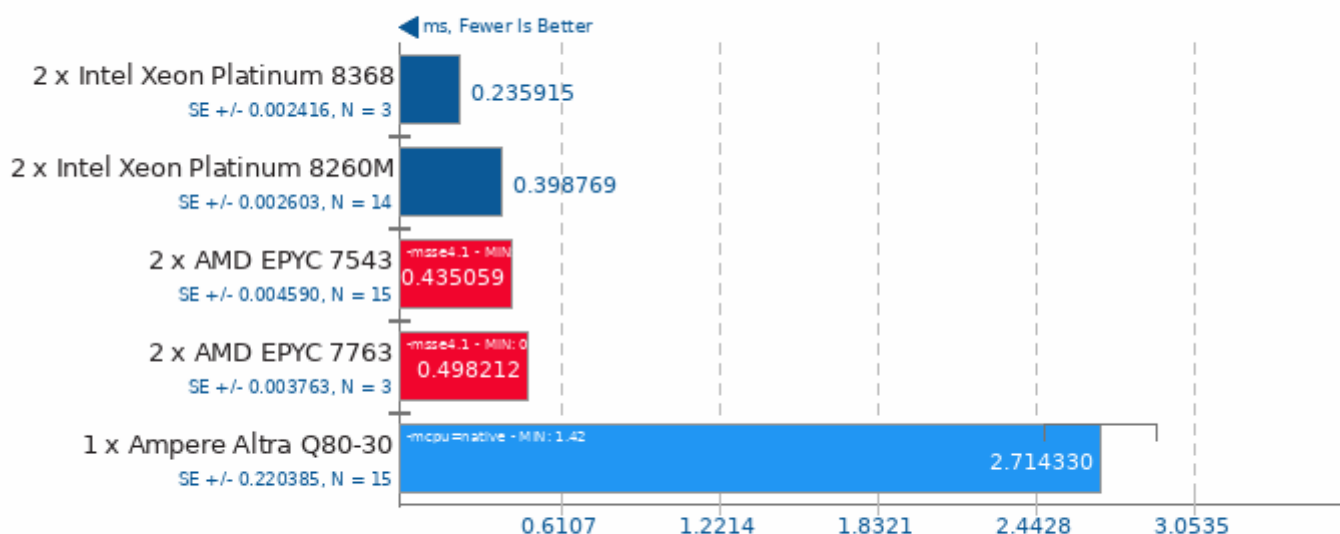
Harness: Recurrent Neural Network Inference - Data Type: u8s8f32 - Engine: CPU



1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -fPIC -pie -pthread

oneDNN 2.0

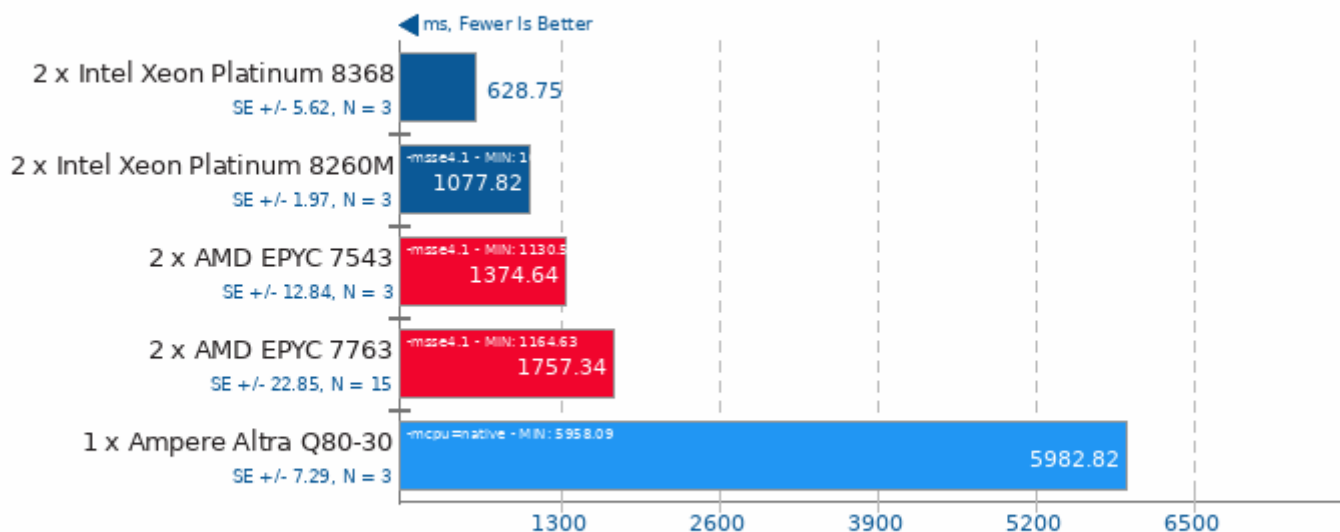
Harness: Matrix Multiply Batch Shapes Transformer - Data Type: f32 - Engine: CPU



1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -fPIC -pie -pthread

oneDNN 2.0

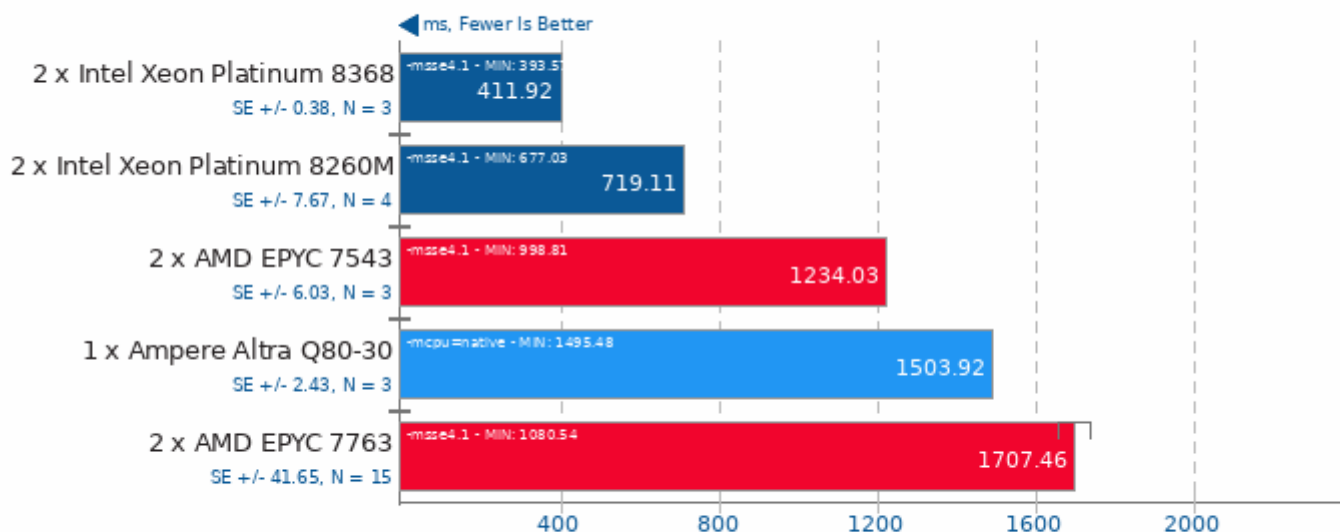
Harness: Recurrent Neural Network Training - Data Type: bf16bf16bf16 - Engine: CPU



1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -fPIC -pie -lpthread

oneDNN 2.0

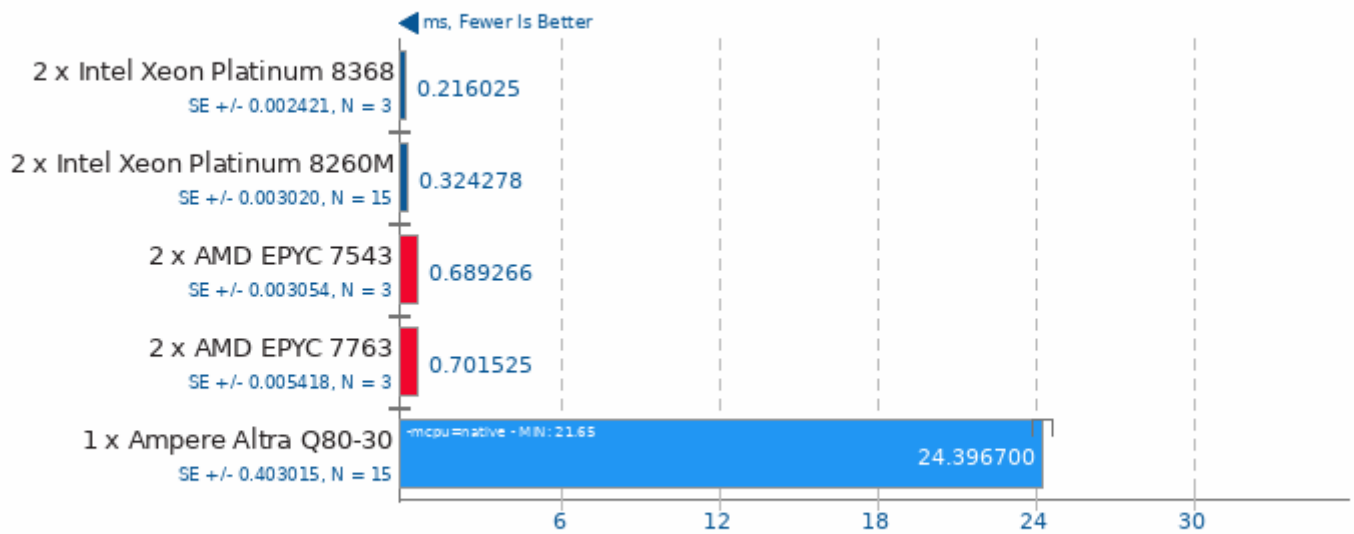
Harness: Recurrent Neural Network Inference - Data Type: bf16bf16bf16 - Engine: CPU



1. (CXX) g++ options: -O3 -std=c++11 -fopenmp -fPIC -pie -lpthread

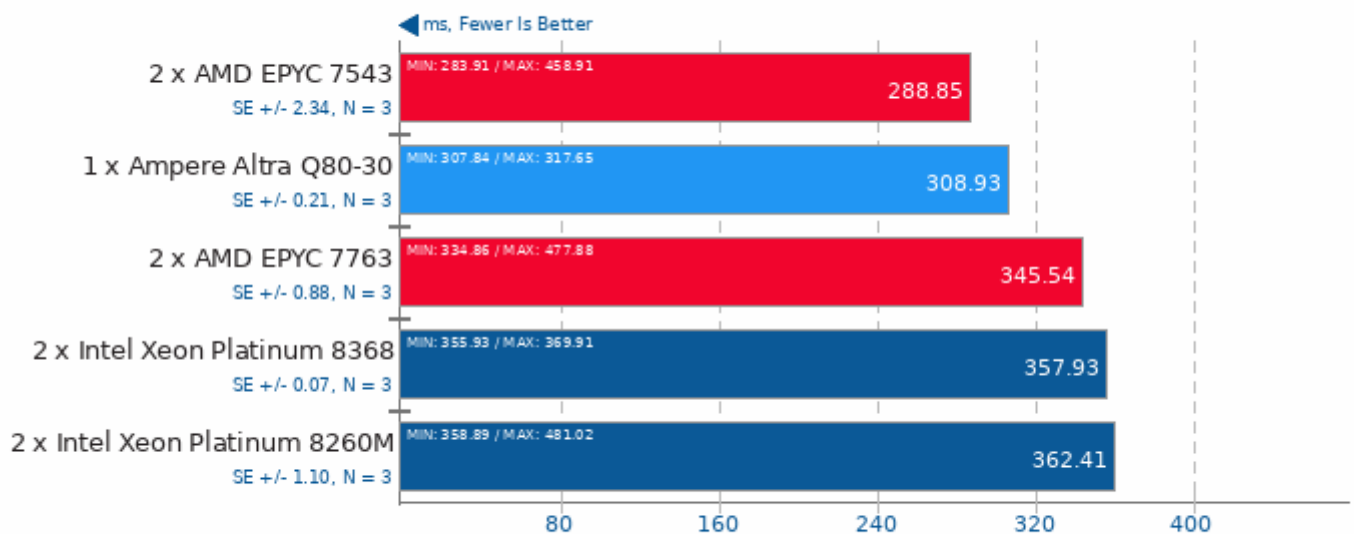
oneDNN 2.0

Harness: Matrix Multiply Batch Shapes Transformer - Data Type: u8s8f32 - Engine: CPU



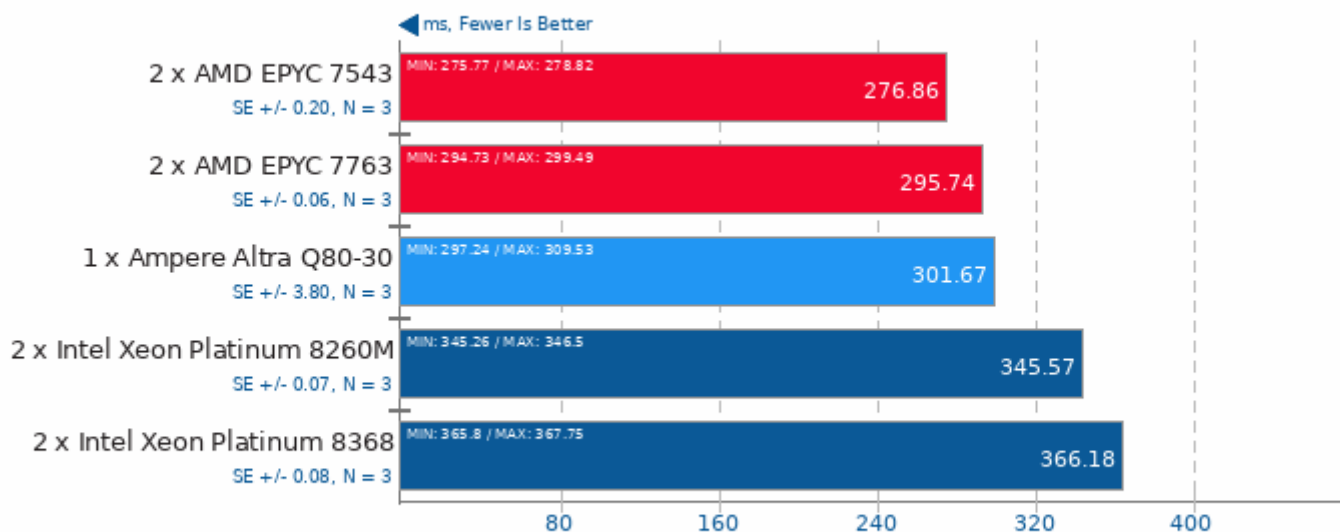
TNN 0.2.3

Target: CPU - Model: MobileNet v2



TNN 0.2.3

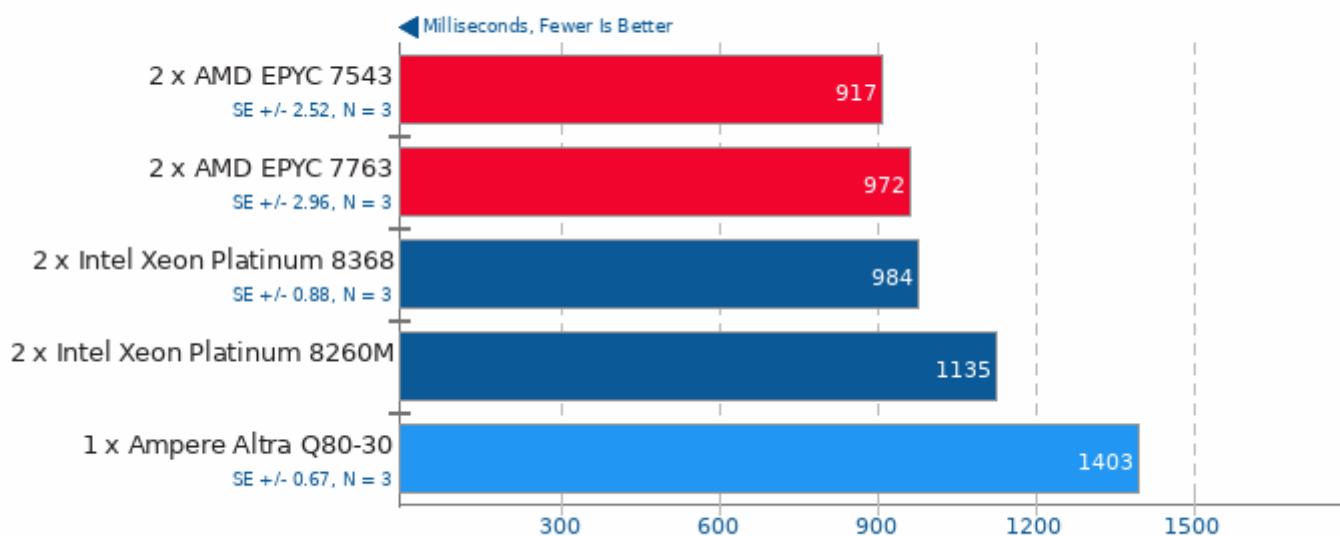
Target: CPU - Model: SqueezeNet v1.1



1. (CXX) g++ options: -fopenmp -pthread -fvisibility=hidden -O3 -rdynamic -ldl

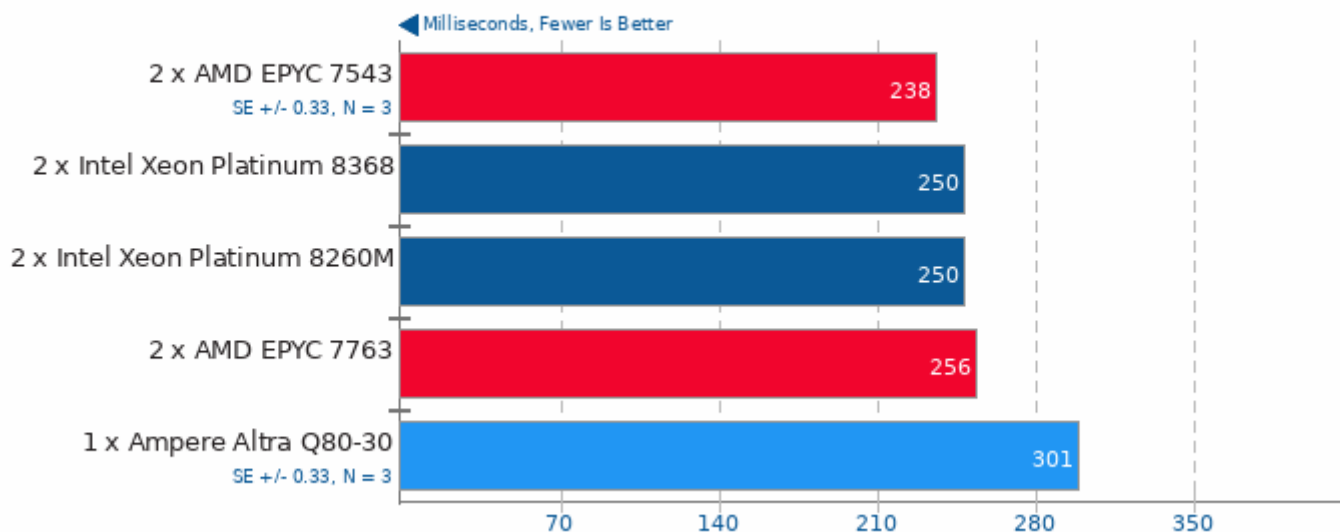
PyBench 2018-02-16

Total For Average Test Times



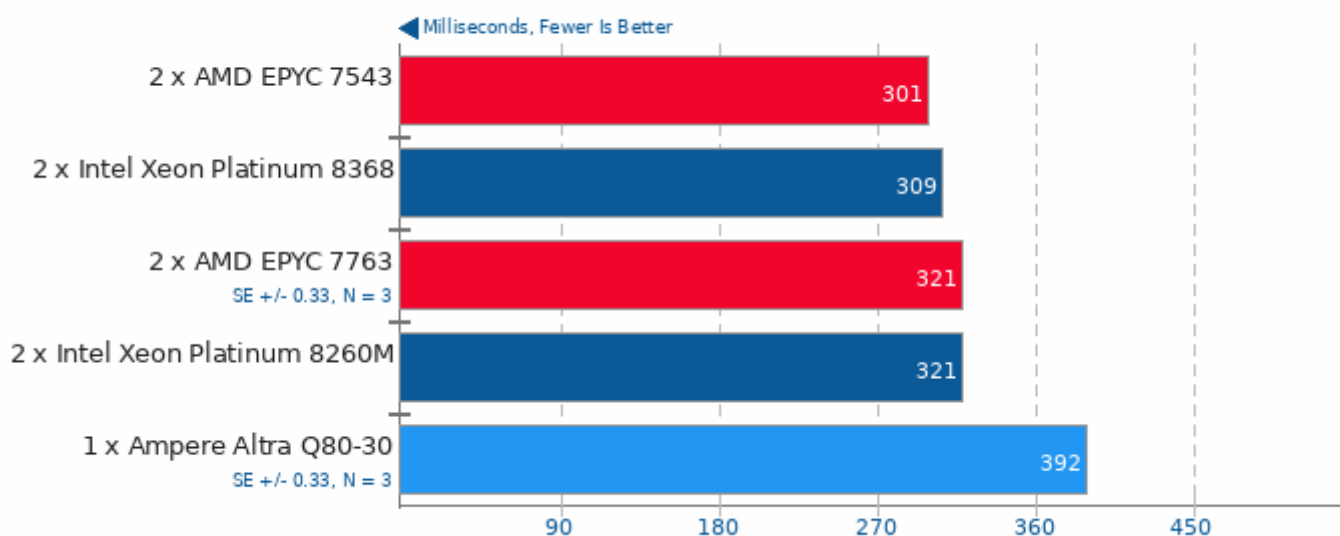
PyPerformance 1.0.0

Benchmark: go



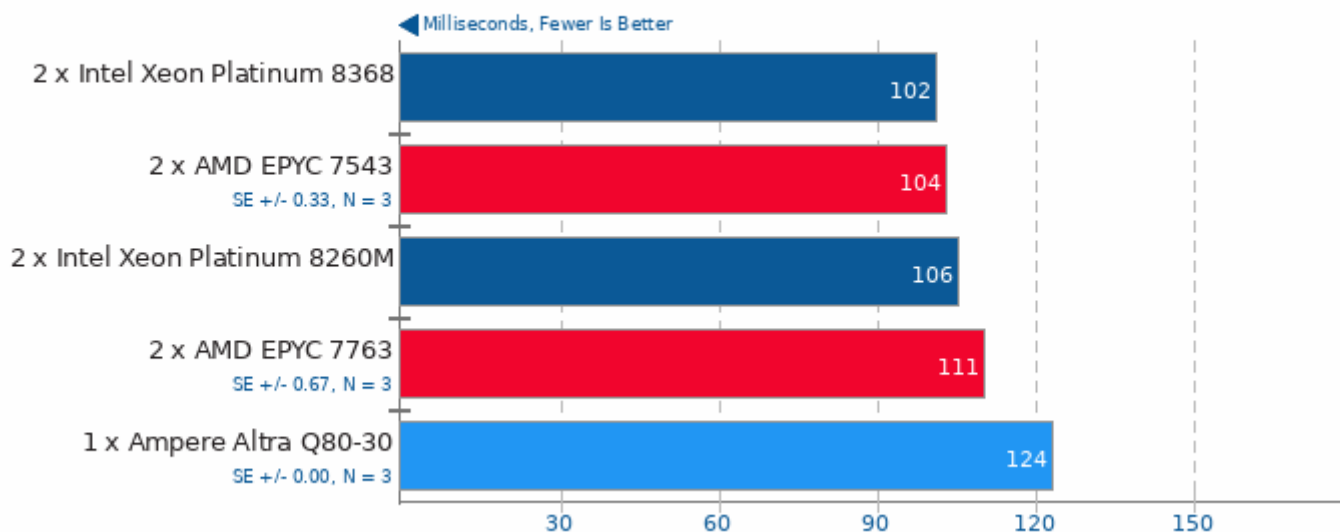
PyPerformance 1.0.0

Benchmark: 2to3



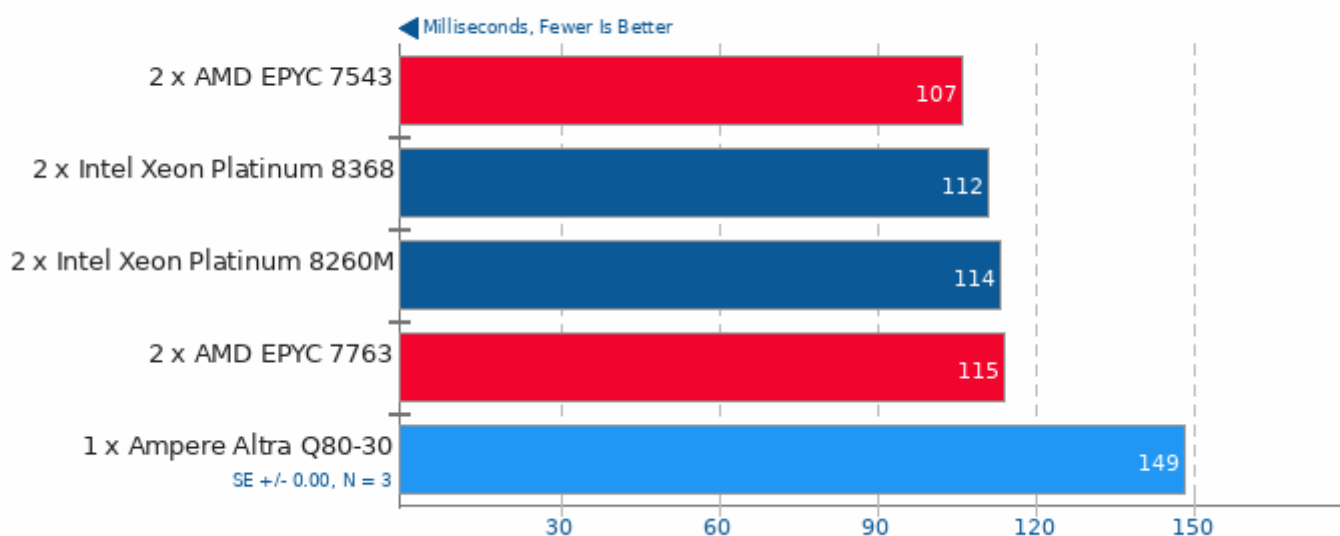
PyPerformance 1.0.0

Benchmark: chaos



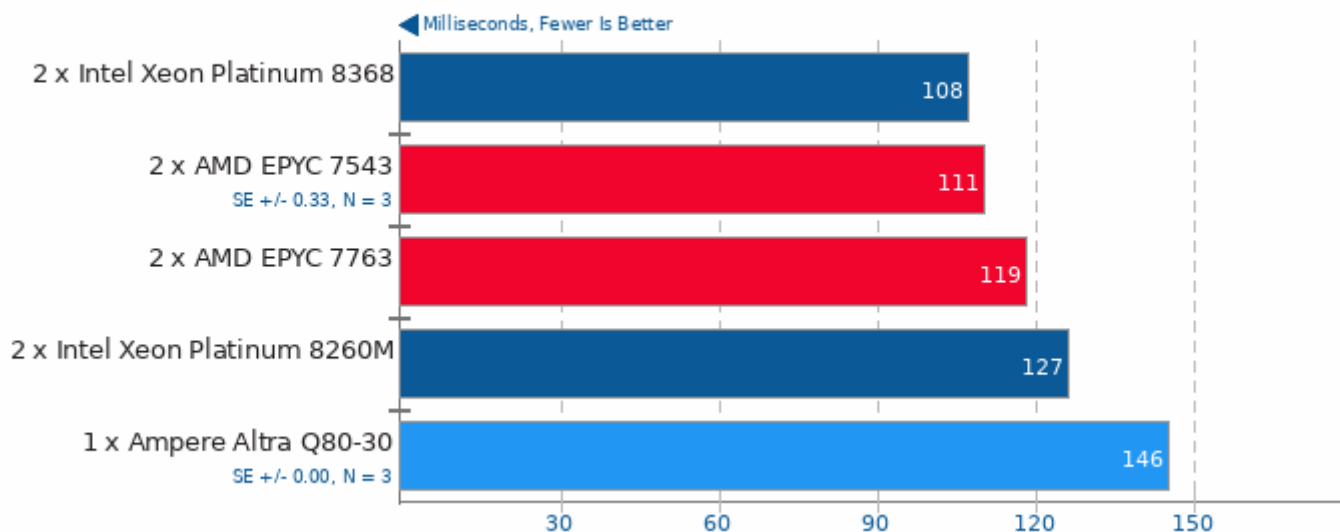
PyPerformance 1.0.0

Benchmark: float



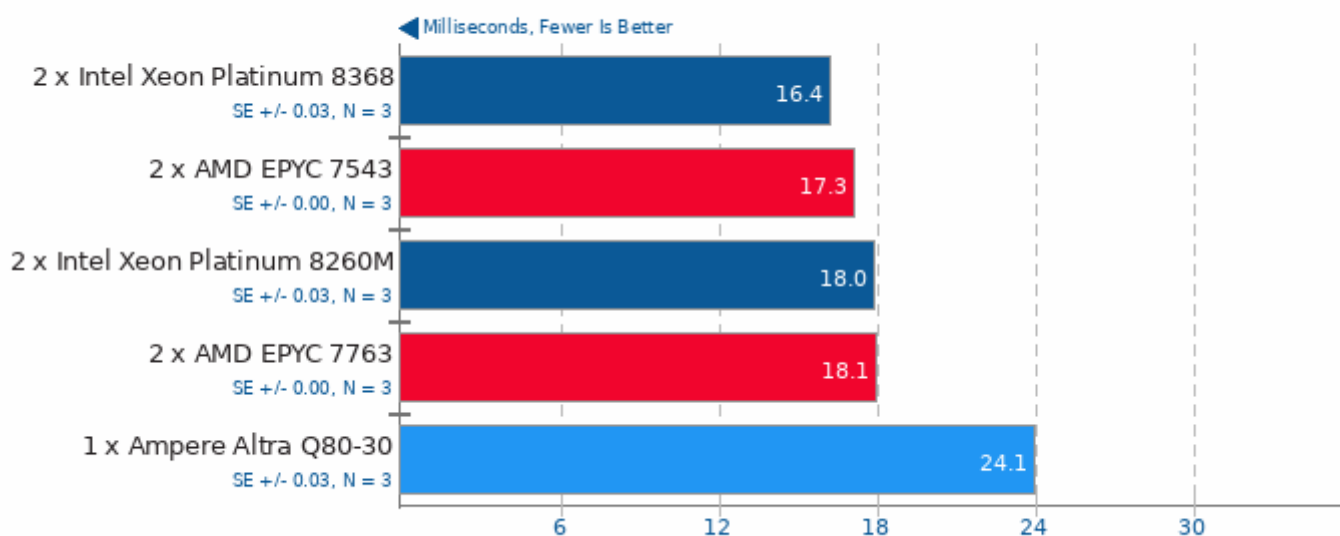
PyPerformance 1.0.0

Benchmark: nbody



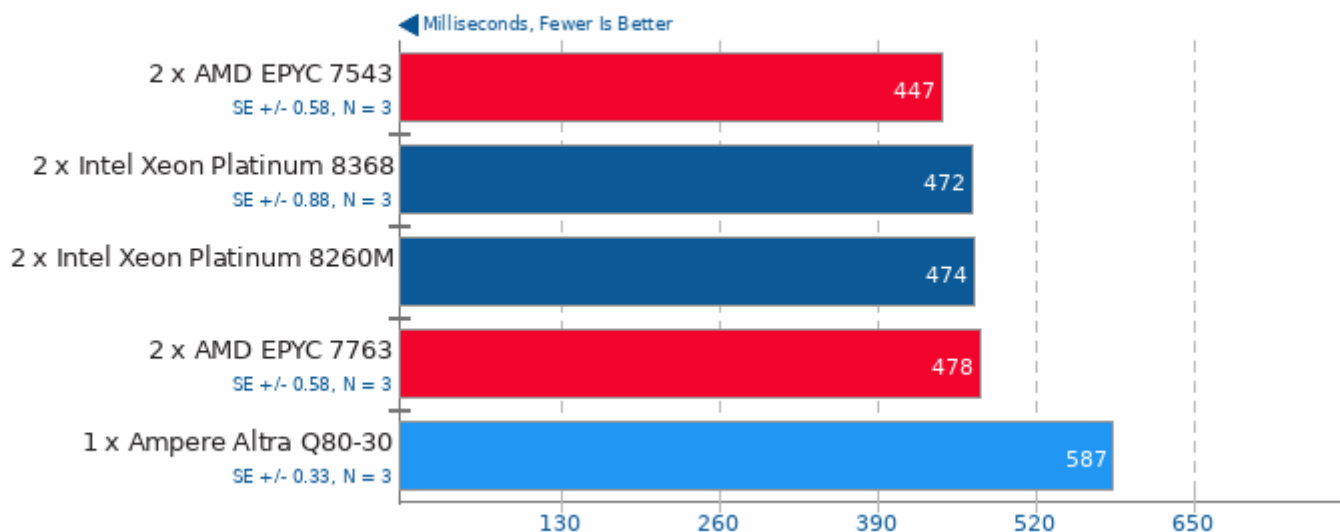
PyPerformance 1.0.0

Benchmark: pathlib



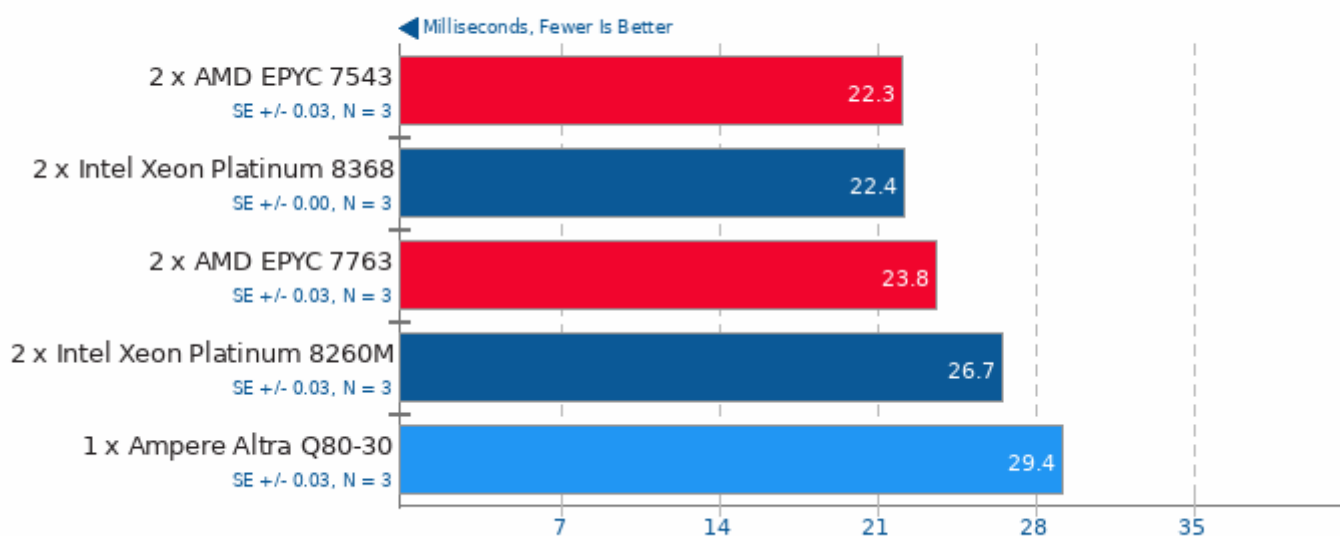
PyPerformance 1.0.0

Benchmark: raytrace



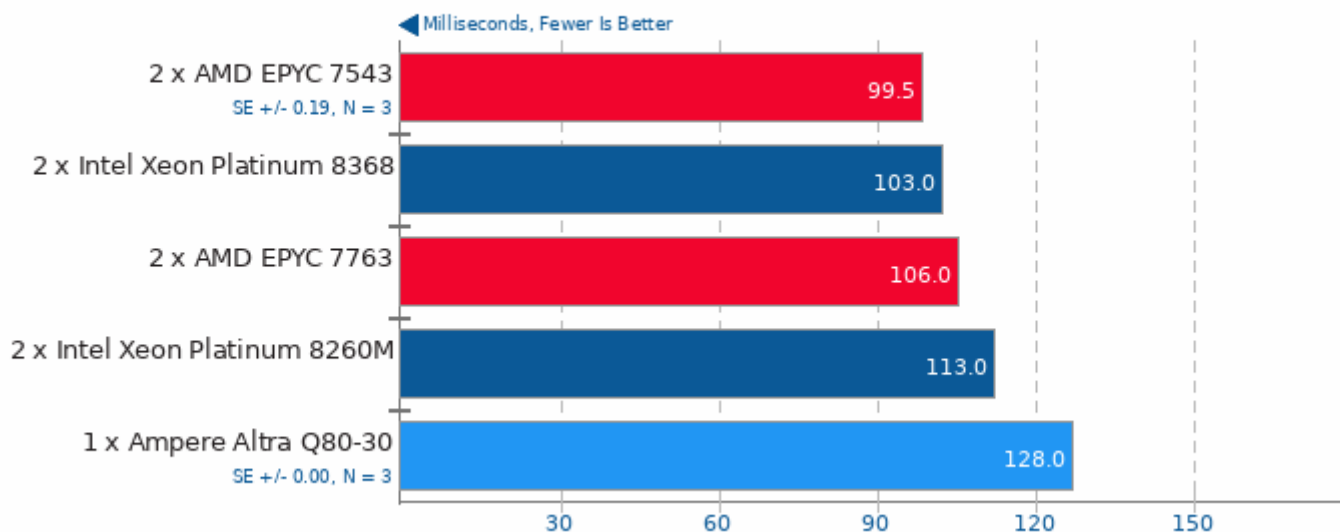
PyPerformance 1.0.0

Benchmark: json_loads



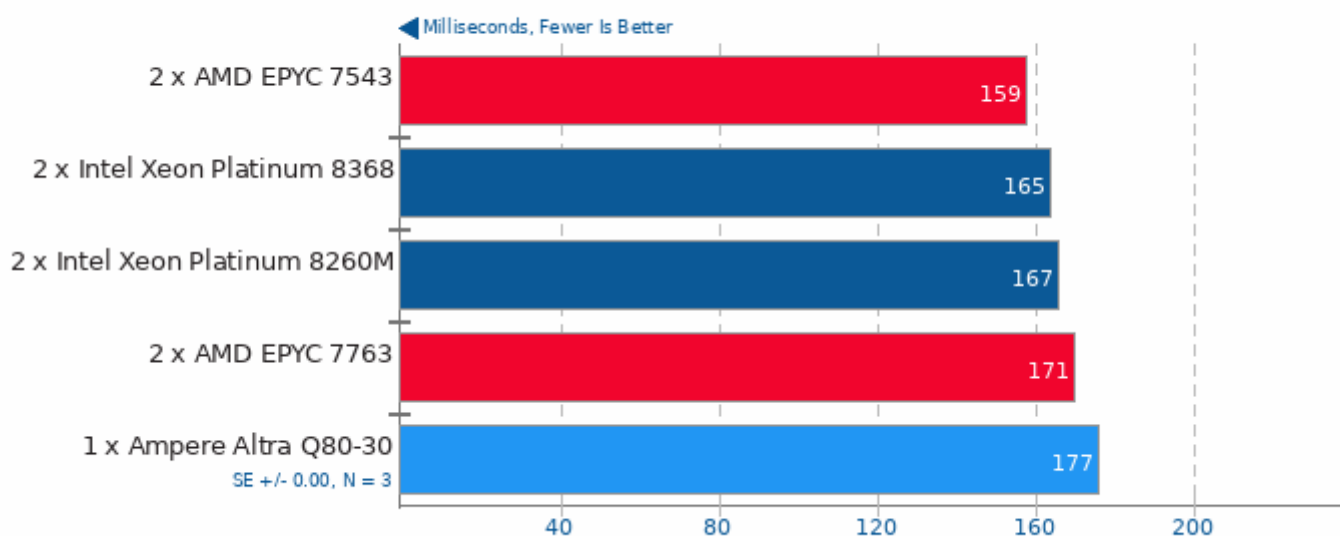
PyPerformance 1.0.0

Benchmark: crypto_pyaes



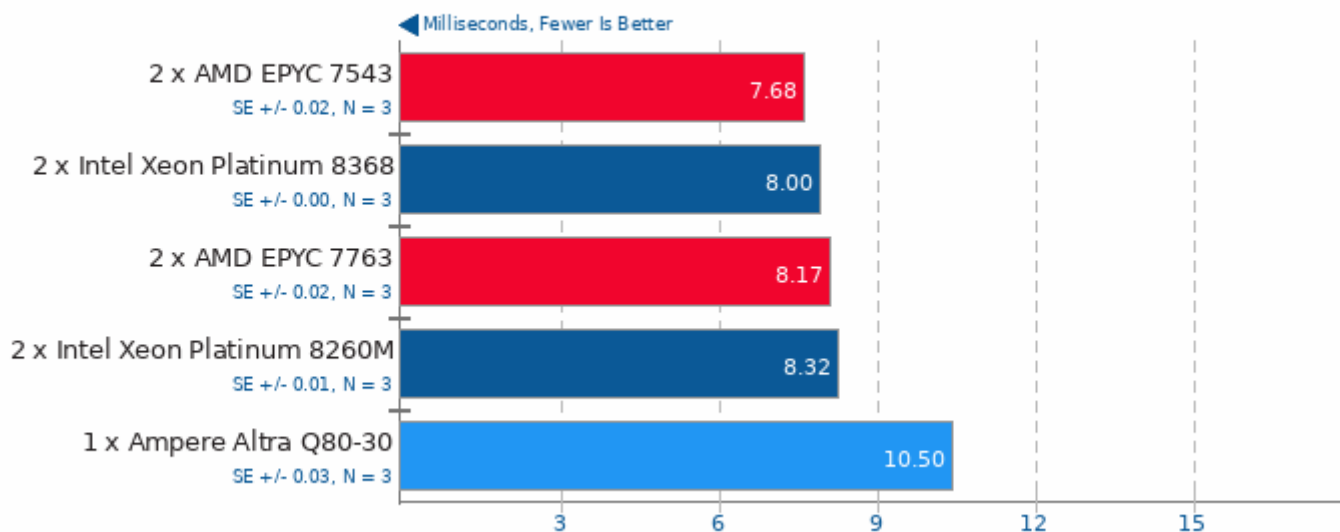
PyPerformance 1.0.0

Benchmark: regex_compile



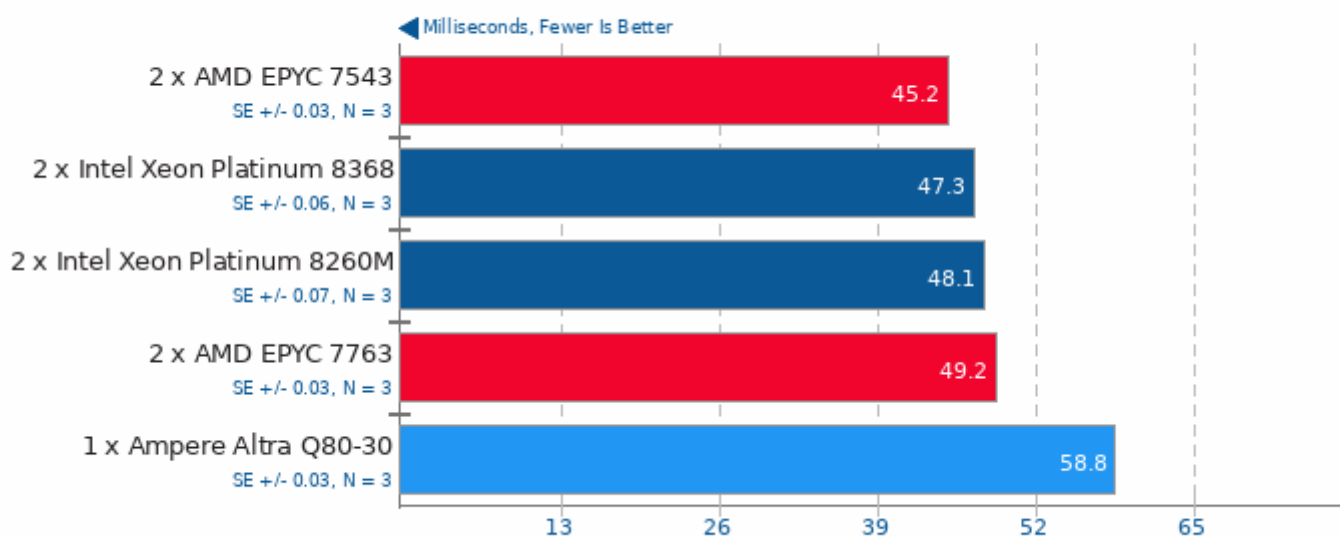
PyPerformance 1.0.0

Benchmark: python_startup



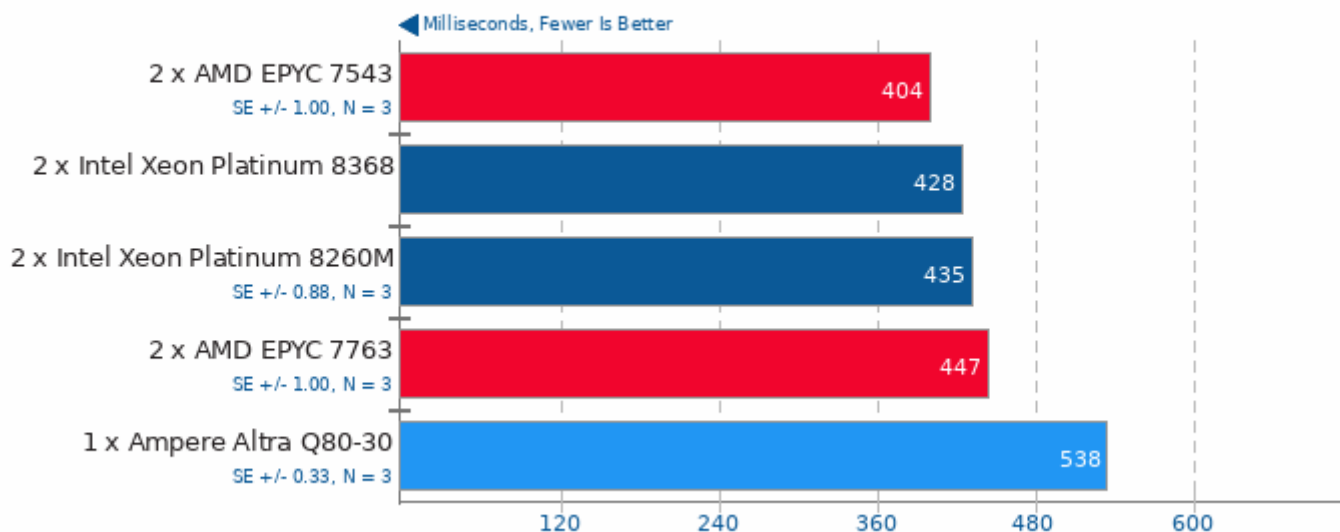
PyPerformance 1.0.0

Benchmark: django_template



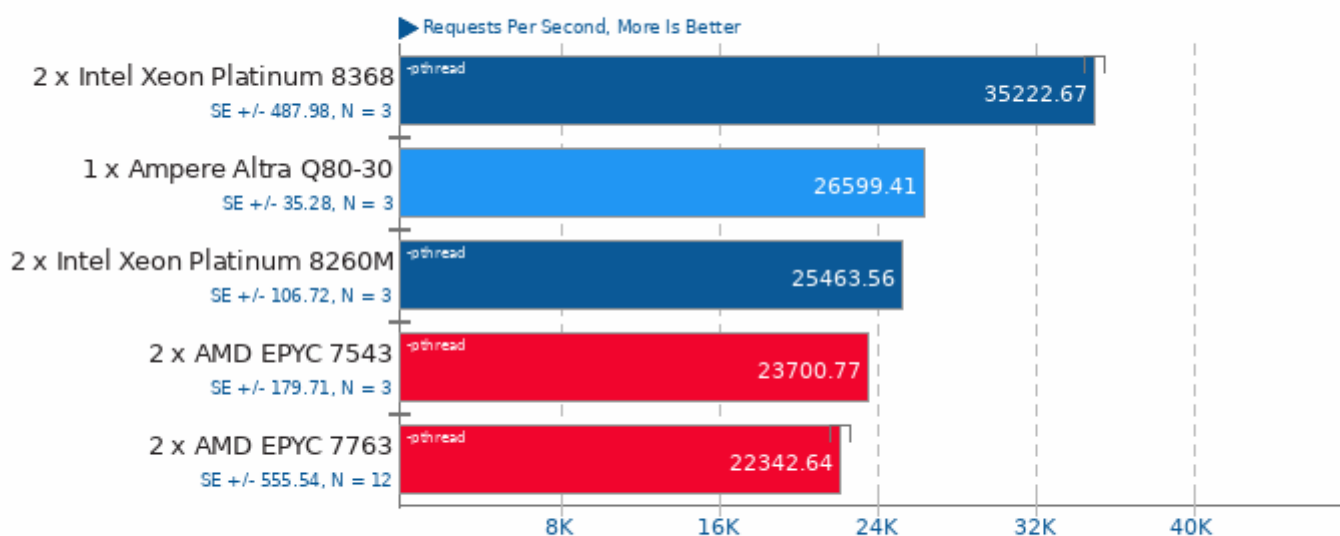
PyPerformance 1.0.0

Benchmark: pickle_pure_python



Apache Benchmark 2.4.29

Static Web Page Serving



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

PHPBench 0.8.1

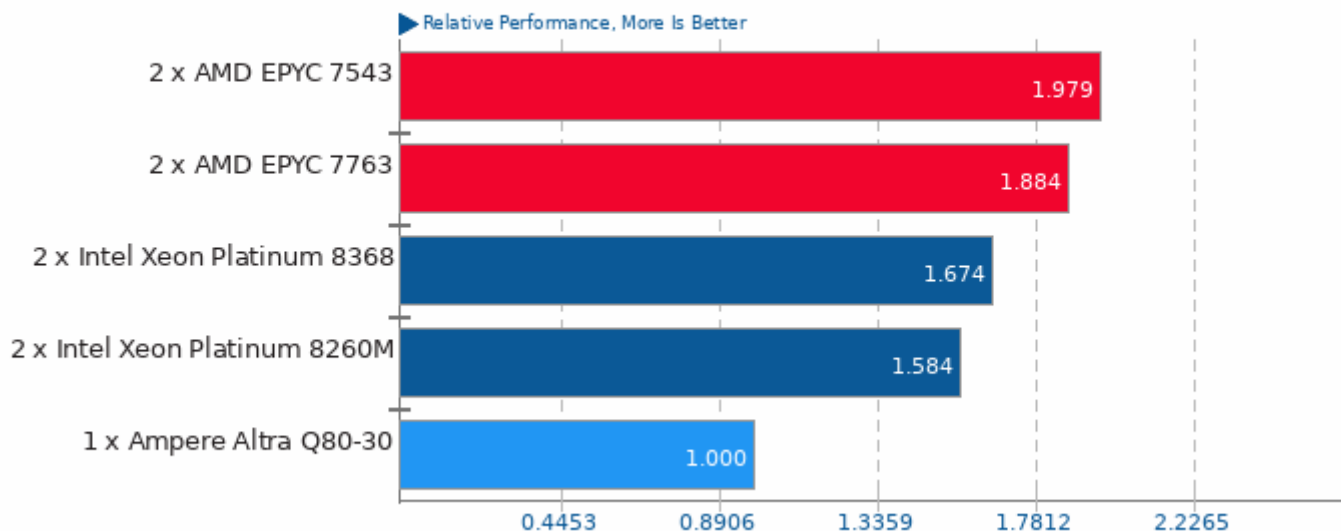
PHP Benchmark Suite



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

Geometric Mean Of Audio Encoding Tests

Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/encode-mp3 and pts/encode-flac

Geometric Mean Of Bioinformatics Tests

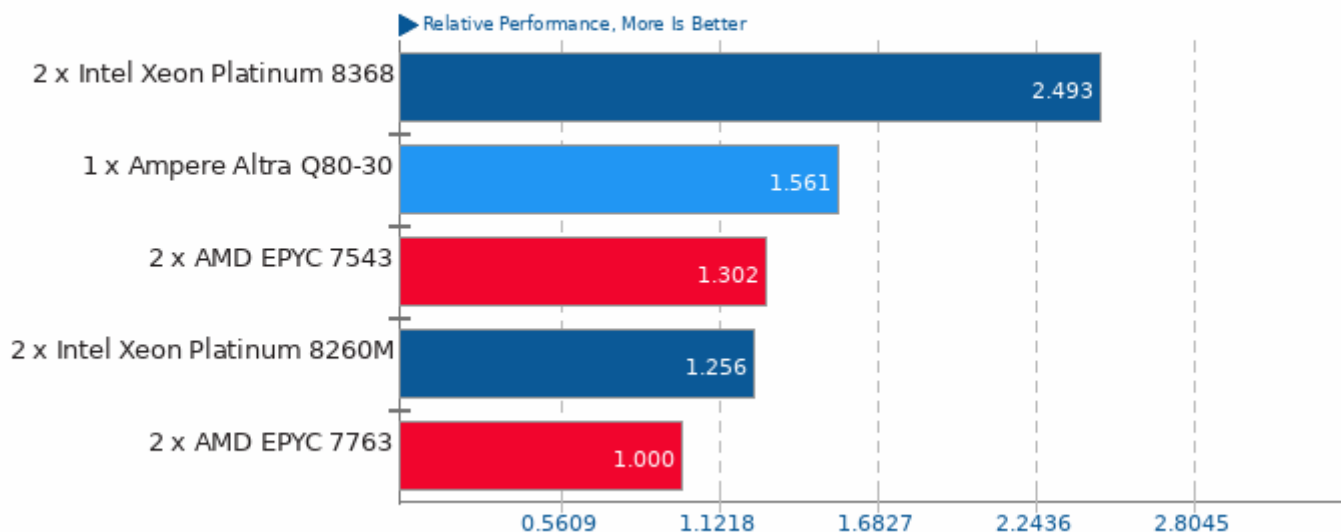
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/himeno and pts/mafft

Geometric Mean Of C++ Boost Tests

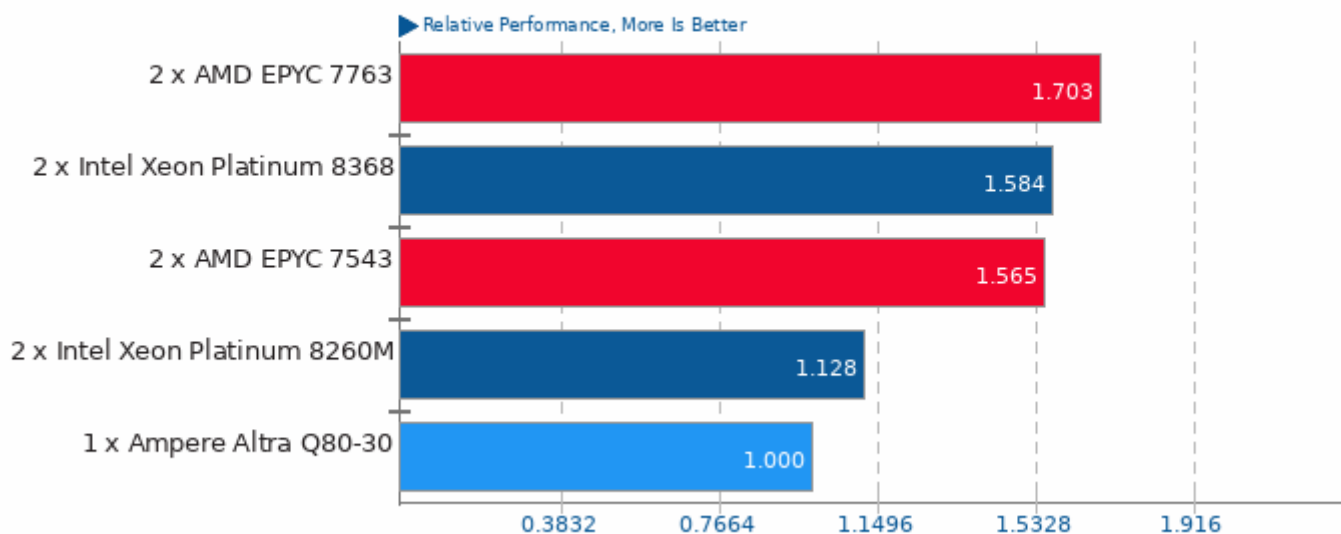
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/openfoam and pts/povray

Geometric Mean Of C/C++ Compiler Tests

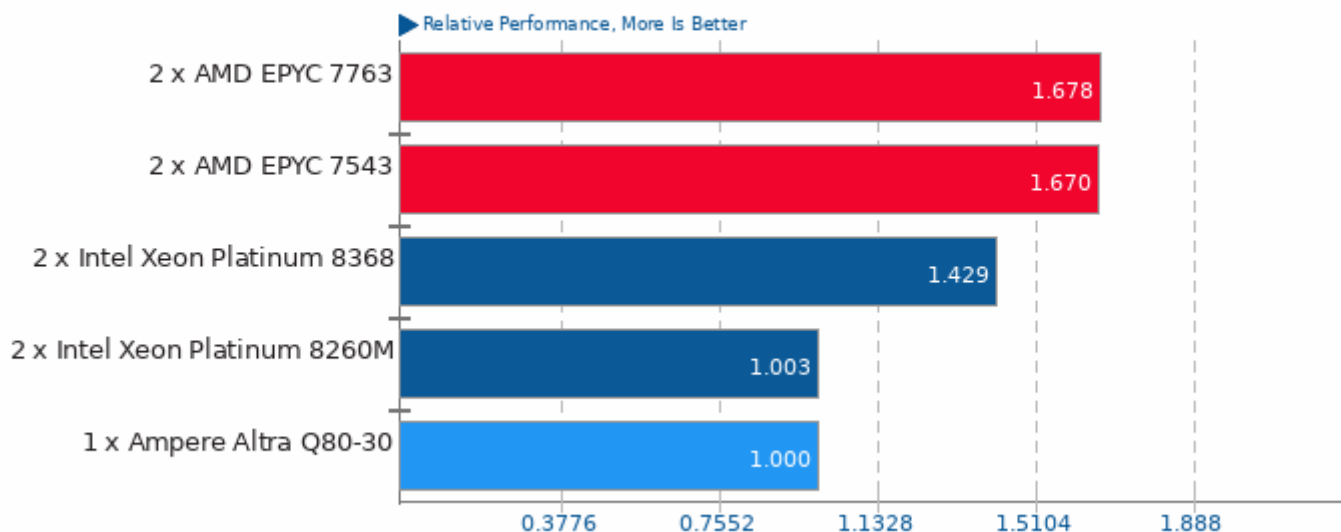
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/mafft, pts/himeno, pts/c-ray, pts/compress-7zip, pts/encode-mp3, pts/encode-flac, pts/pgbench, pts/apache, pts/sqlite-speedtest, pts/dav1d, pts/x264, pts/x265, pts/kvazaar, pts/compress-zstd and pts/openssl

Geometric Mean Of Compression Tests

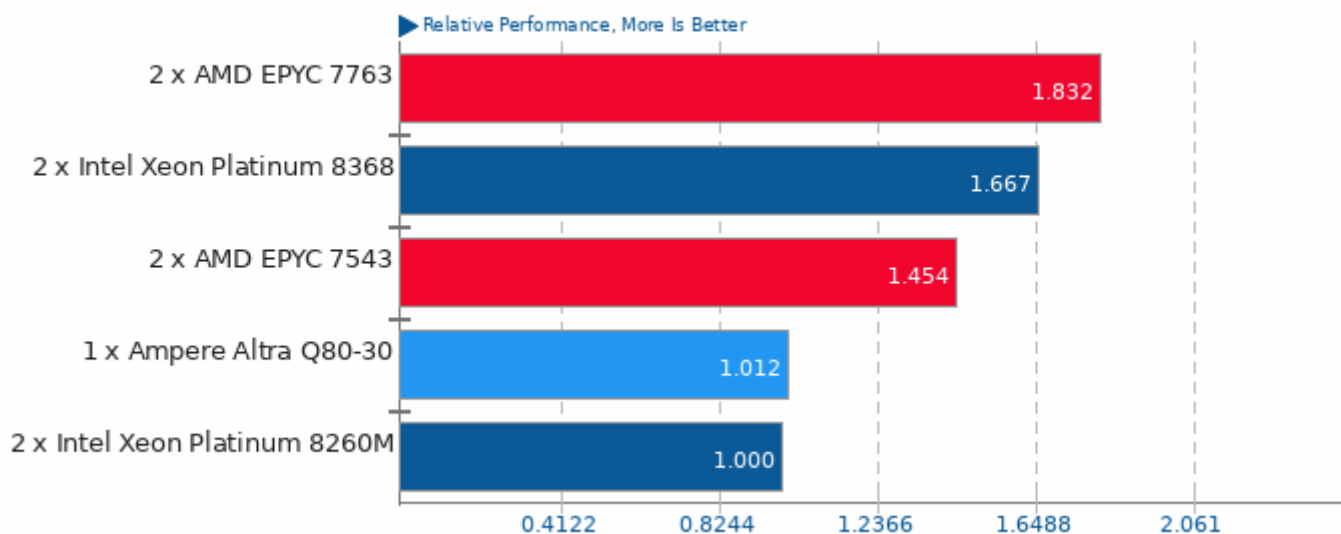
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



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

Geometric Mean Of CPU / Processor Suite Tests

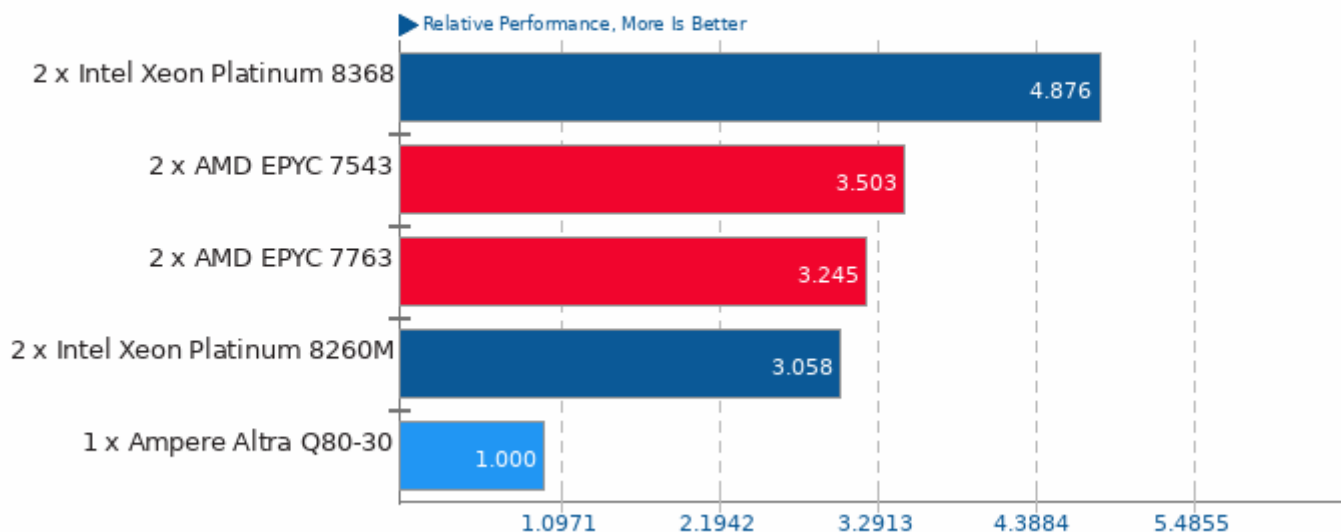
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/rodinia, pts/x264, pts/x265, pts/compress-7zip, pts/build-linux-kernel, pts/openssl, pts/sysbench and pts/povray

Geometric Mean Of Creator Workloads Tests

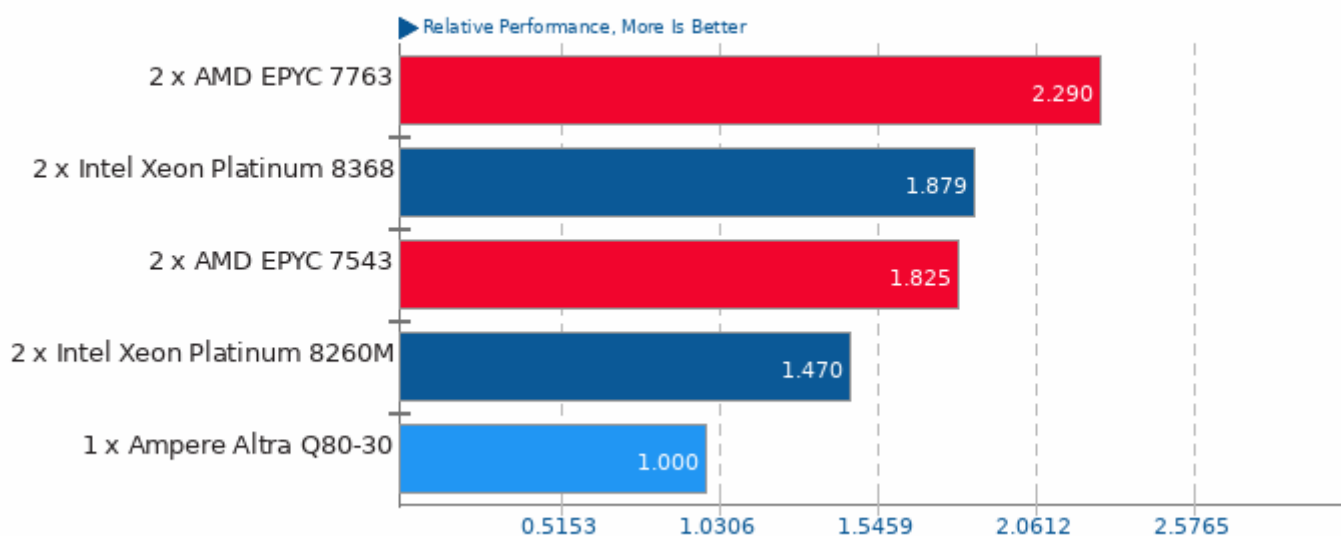
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/c-ray, pts/povray, pts/x264, pts/x265, pts/kvazaar, pts/dav1d, pts/encode-mp3, pts/encode-flac, pts/onednn and pts/ngspice

Geometric Mean Of Cryptography Tests

Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



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

Geometric Mean Of Database Test Suite

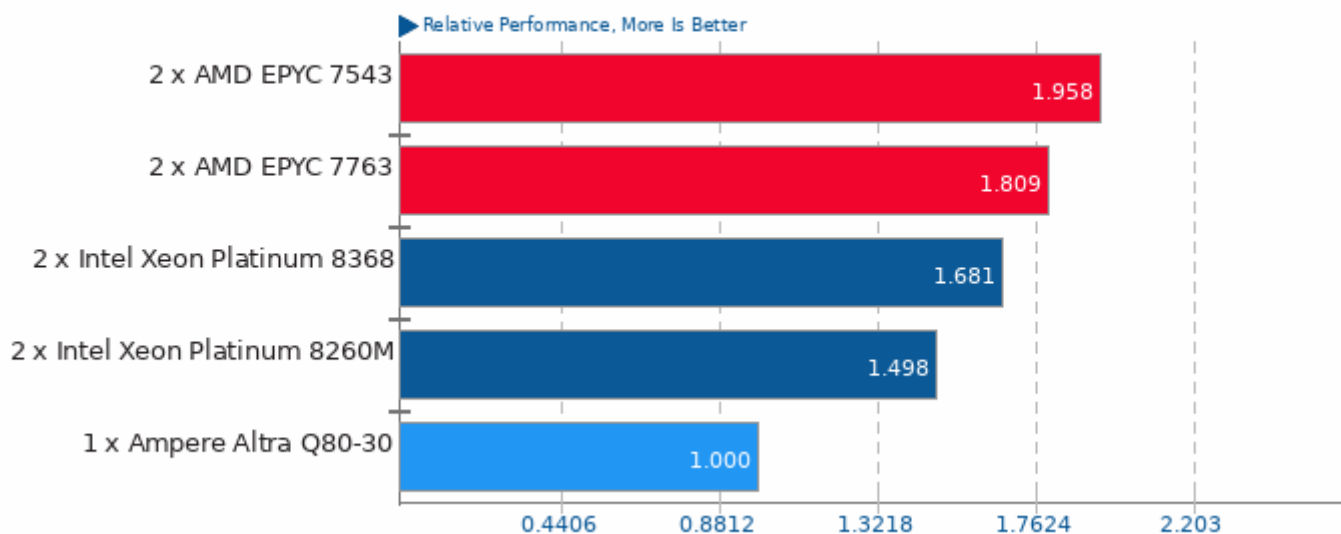
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/sqlite-speedtest, pts/redis, pts/cassandra, pts/pgbench and pts/mysqslap

Geometric Mean Of Electronic Design Tests

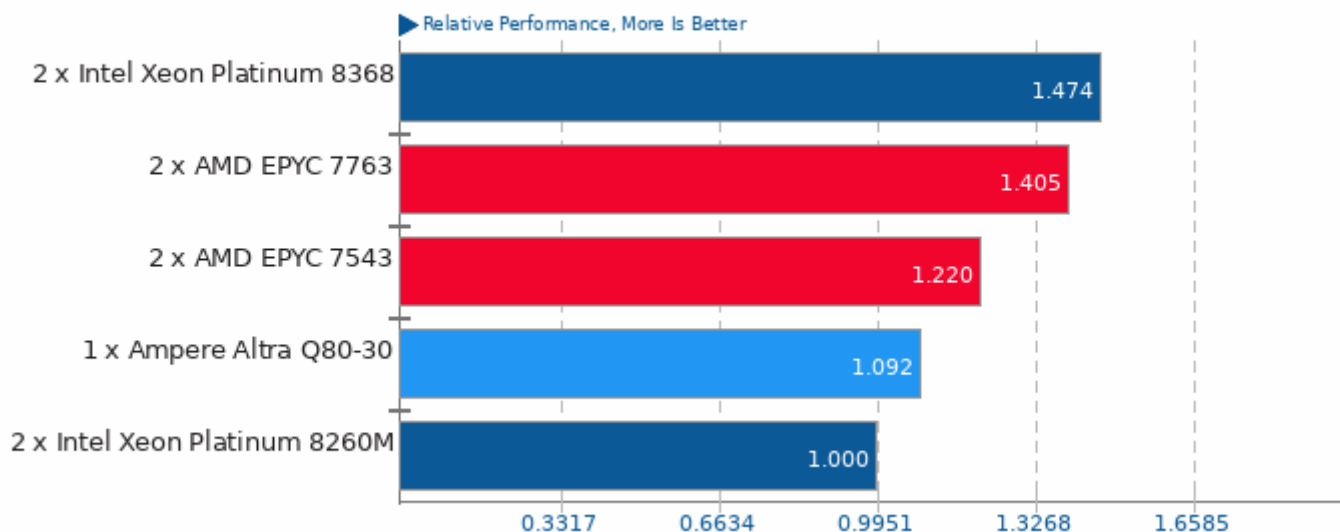
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/ngspice

Geometric Mean Of Fortran Tests

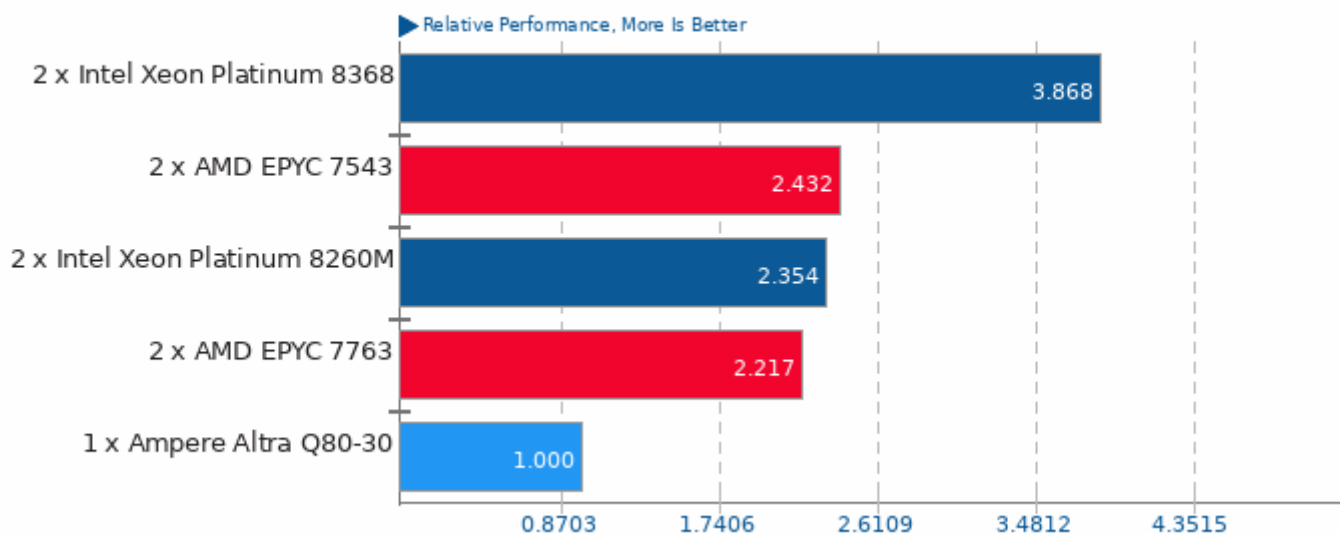
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/npb, pts/dolfyn and pts/neat

Geometric Mean Of HPC - High Performance Computing Tests

Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/npb, pts/rodinia, pts/neat, pts/mt-dgemm, pts/dolfyn, pts/pennant, pts/openfoam, pts/himeno, pts/mafft, pts/kripke, pts/tnn, pts/numpy and pts/onednn

Geometric Mean Of Java Tests

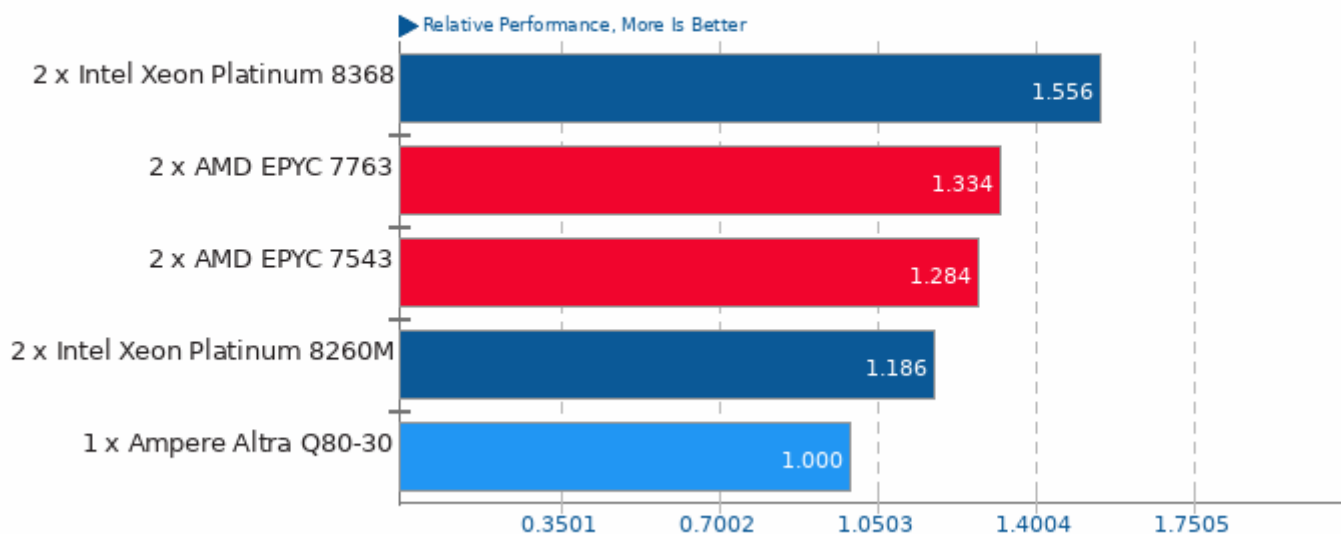
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/java-scimark2 and pts/renaissance

Geometric Mean Of Common Kernel Benchmarks Tests

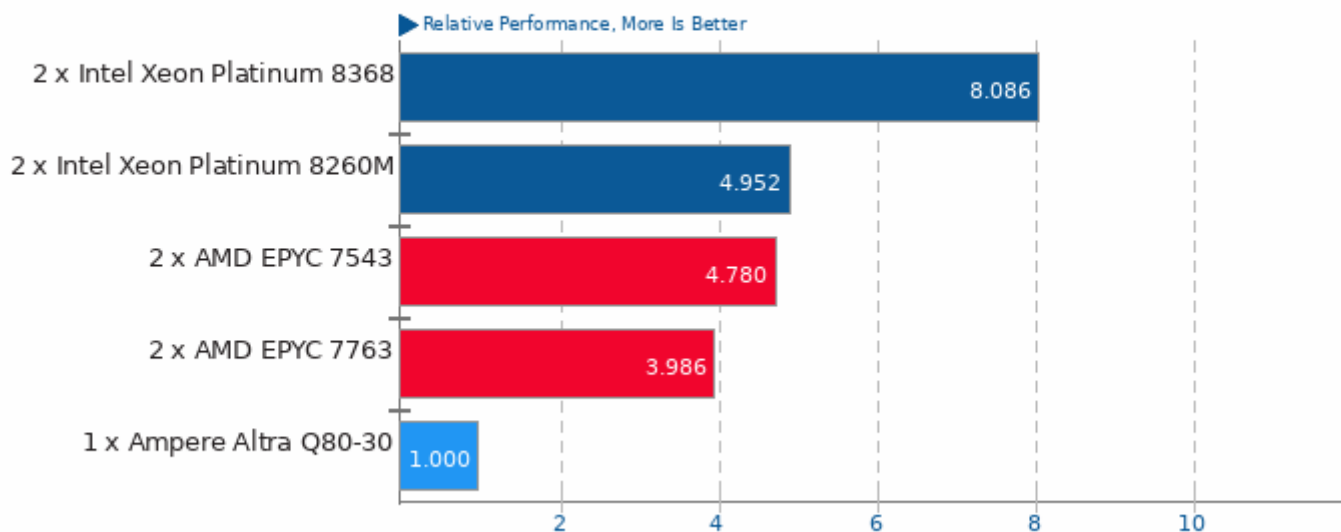
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/apache, pts/postmark, pts/sqlite-speedtest, pts/pgbench, pts/openssl and pts/osbench

Geometric Mean Of Machine Learning Tests

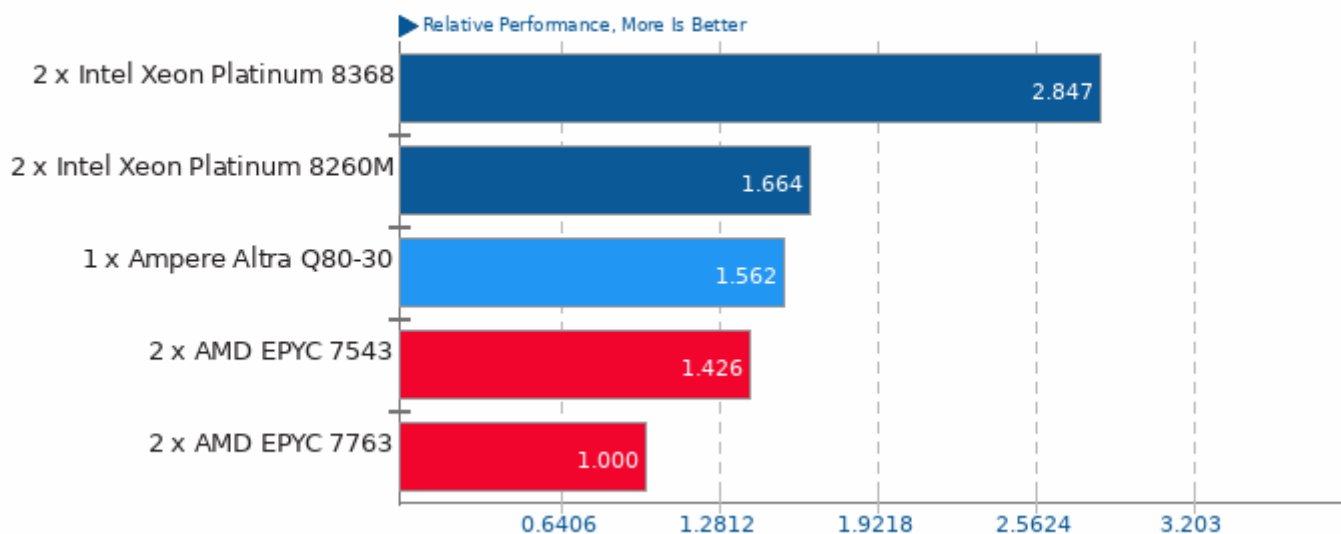
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/tnn, pts/numpy and pts/onednn

Geometric Mean Of Molecular Dynamics Tests

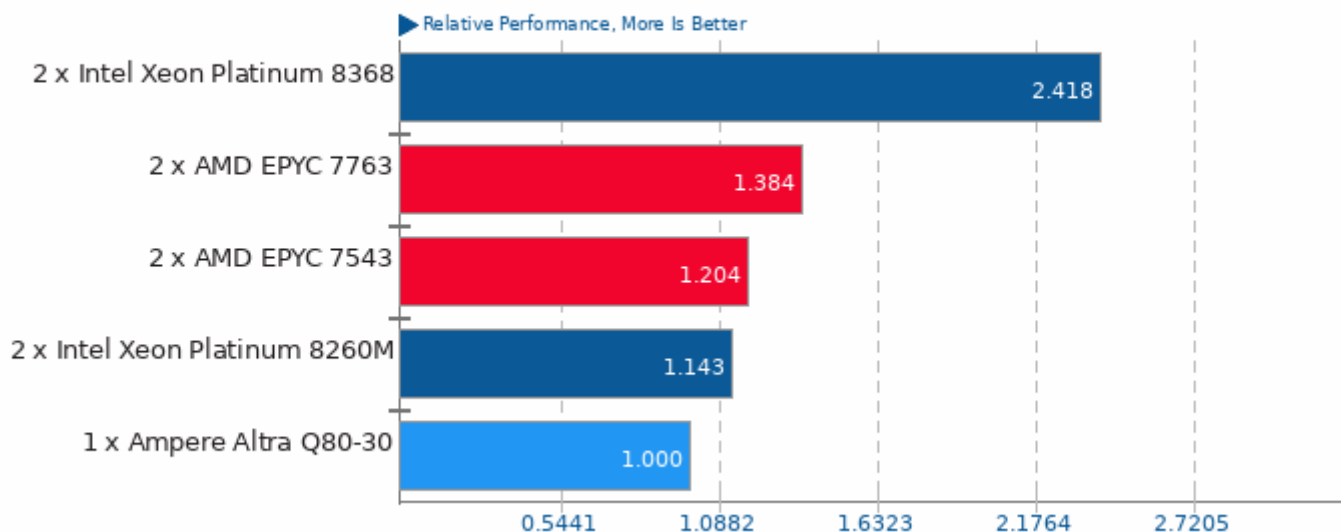
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/dolfyn, pts/pennant and pts/openfoam

Geometric Mean Of MPI Benchmarks Tests

Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/pennant and pts/npb

Geometric Mean Of NVIDIA GPU Compute Tests

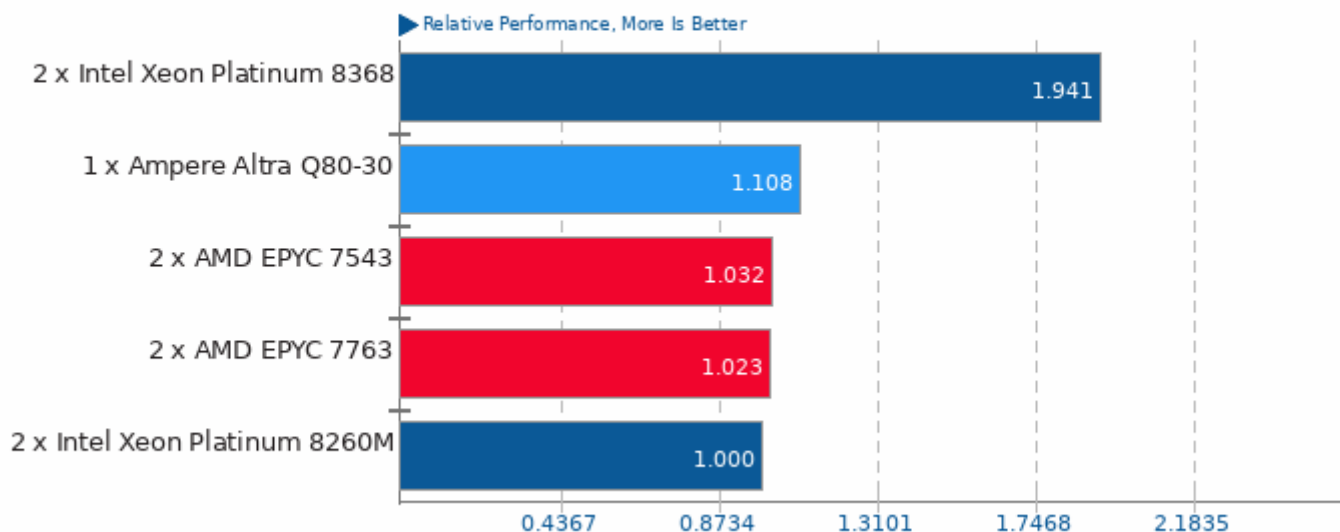
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/robinia and pts/financebench

Geometric Mean Of OpenMPI Tests

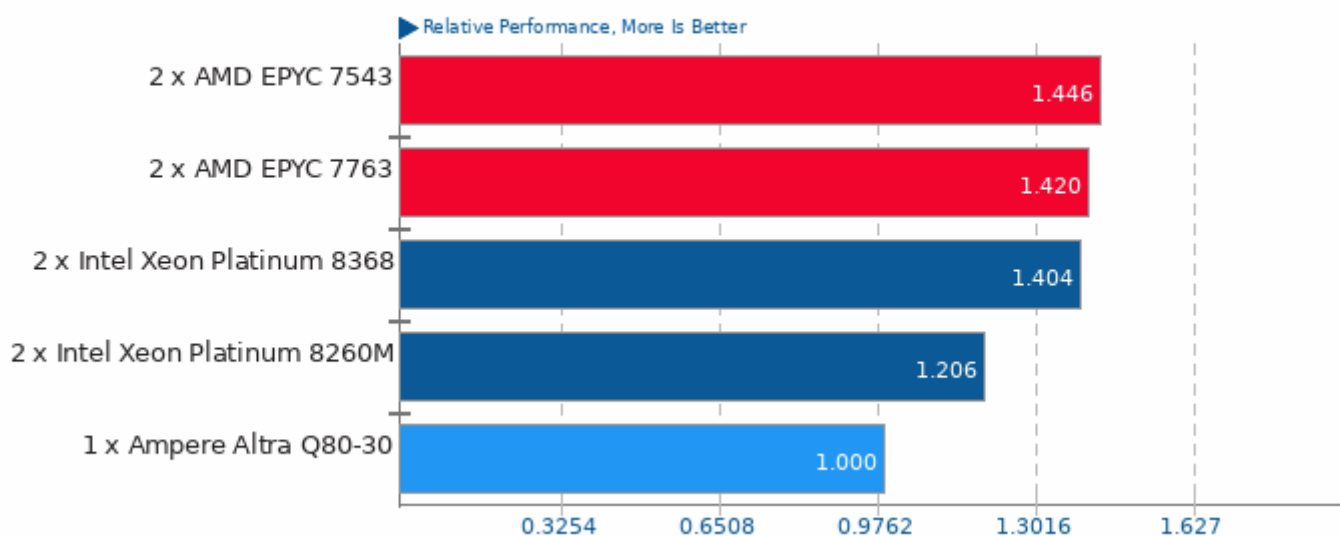
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/npb, pts/rodinia, pts/pennant and pts/openfoam

Geometric Mean Of Programmer / Developer System Benchmarks Tests

Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/sqlite-speedtest, pts/compress-zstd, pts/pyperformance, pts/pybench, pts/build-linux-kernel and pts/mt-dgemm

Geometric Mean Of Python Tests

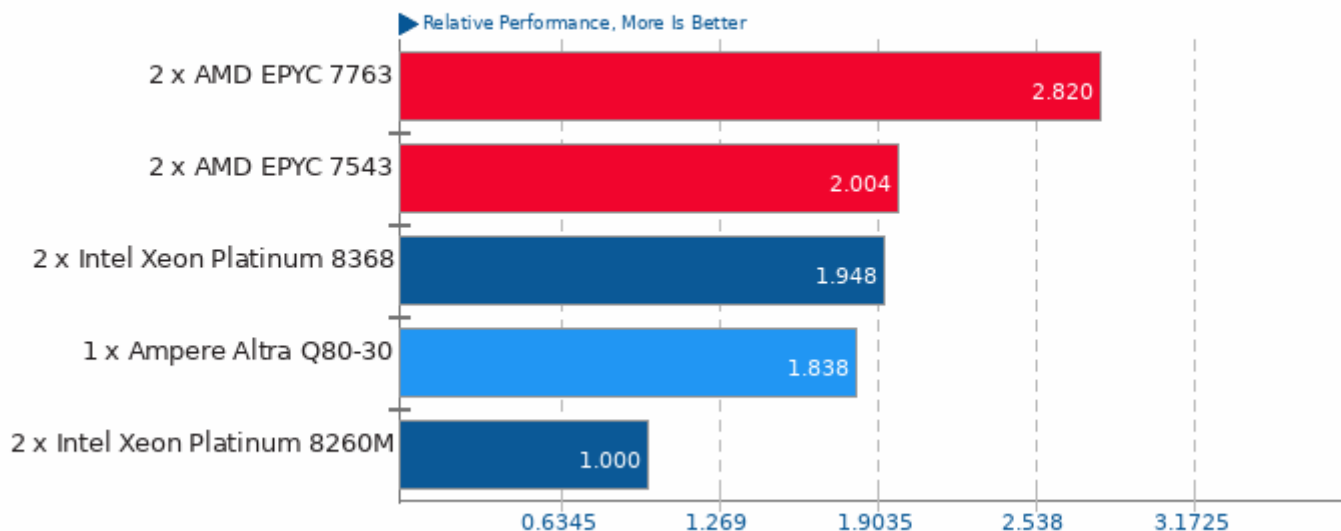
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/pybench, pts/numpy and pts/pyperformance

Geometric Mean Of Raytracing Tests

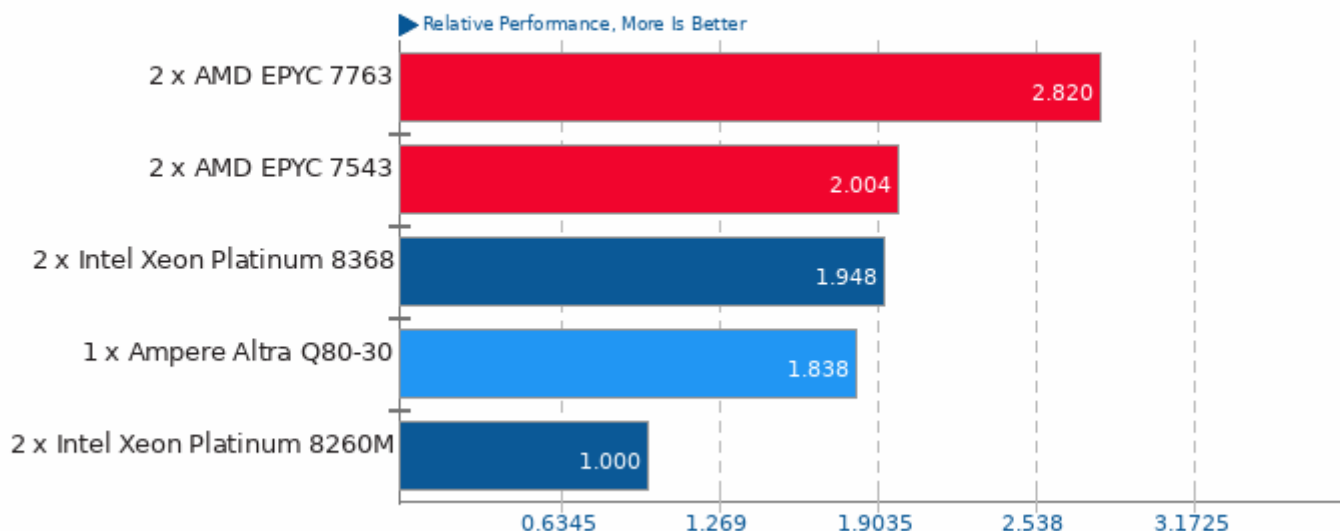
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



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

Geometric Mean Of Renderers Tests

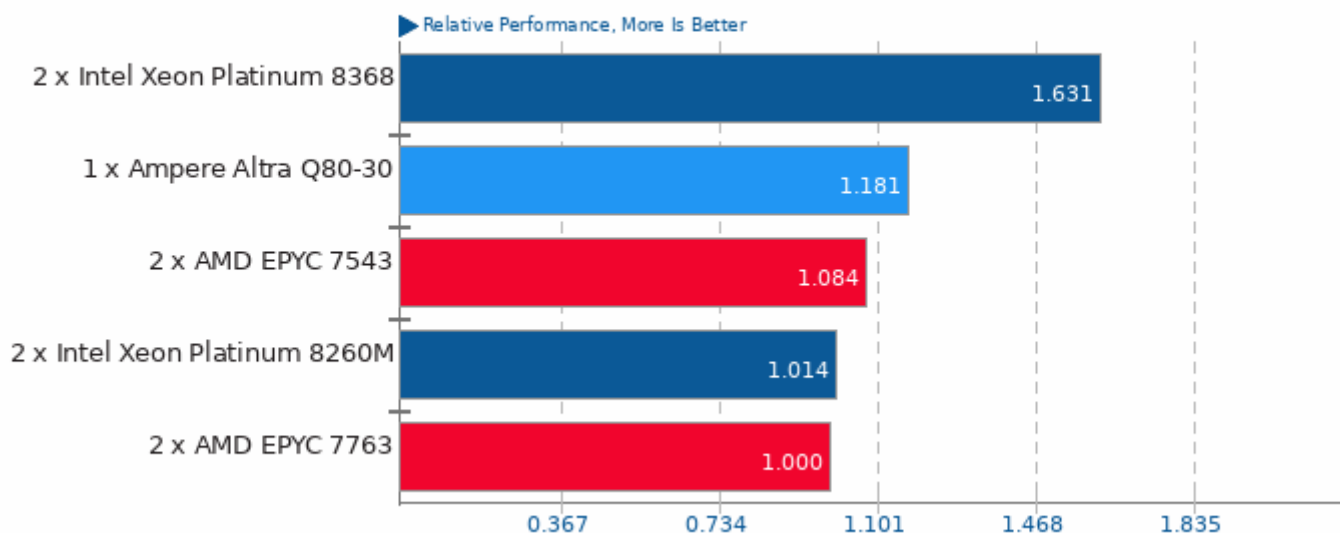
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



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

Geometric Mean Of Scientific Computing Tests

Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/neat, pts/mt-dgemm, pts/dolfyn, pts/pennant, pts/openfoam, pts/himeno, pts/mafft and pts/kripke

Geometric Mean Of Server Tests

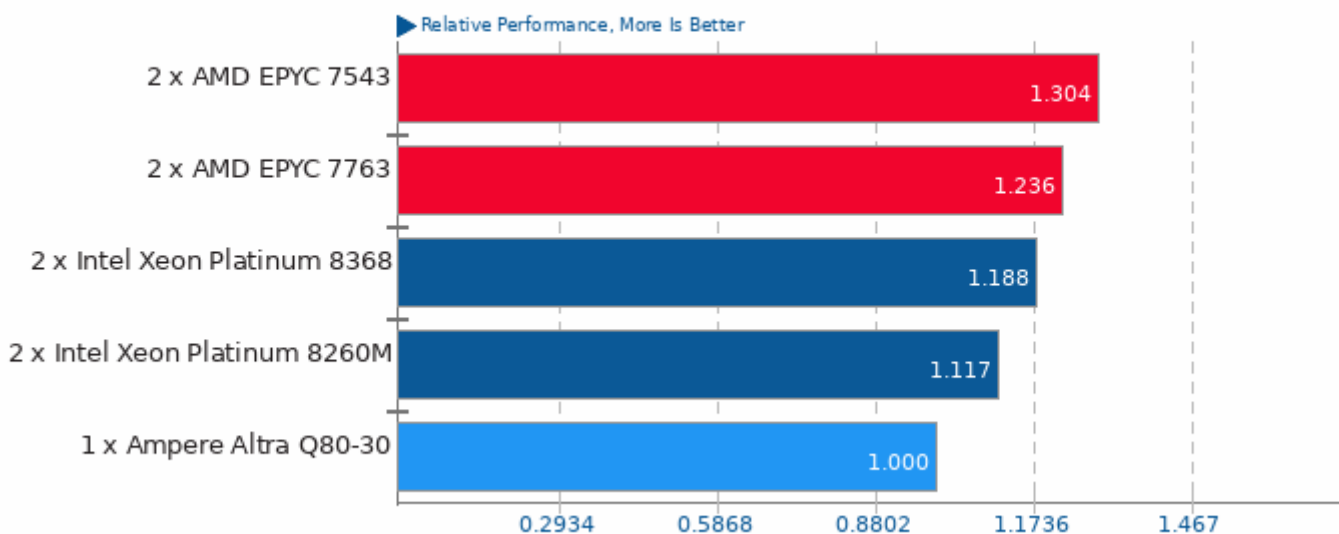
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/apache, pts/mysqslap, pts/pgbench, pts/redis, pts/cassandra, pts/phpbench, pts/openssl and pts/sqlite-speedtest

Geometric Mean Of Single-Threaded Tests

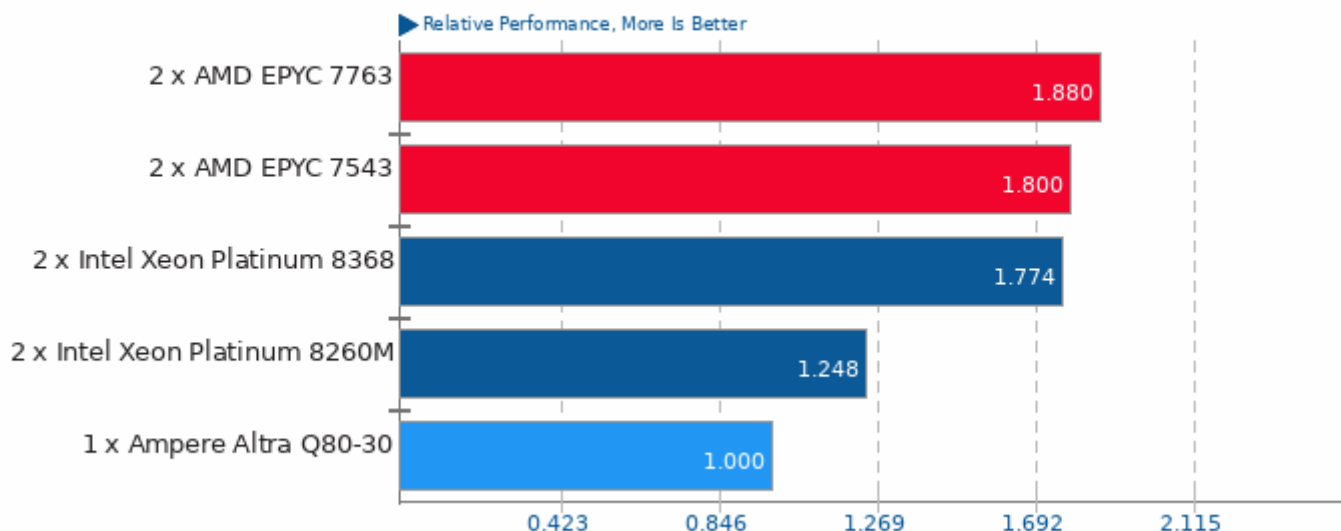
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/java-scimark2, pts/byte, pts/cachebench, pts/numpy, pts/compress-gzip, pts/encode-flac, pts/encode-mp3, pts/gnupg, pts/redis, pts/pybench and pts/phpbench

Geometric Mean Of Video Encoding Tests

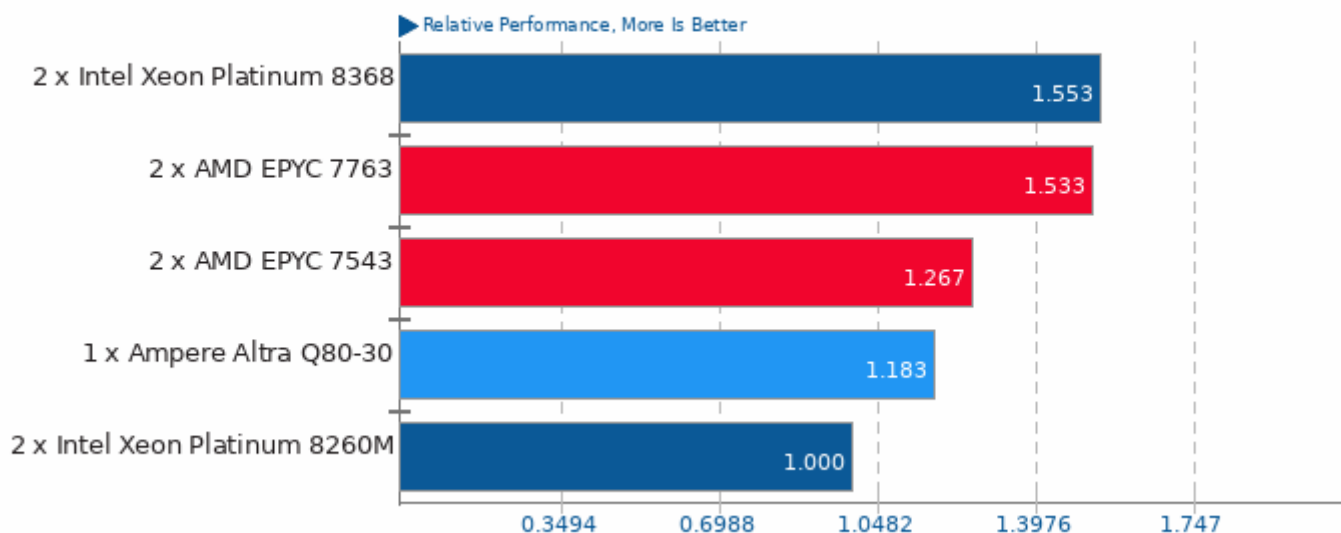
Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/x264, pts/x265, pts/kvazaar and pts/dav1d

Geometric Mean Of Common Workstation Benchmarks Tests

Result Composite - Ampere Altra vs. Intel Xeon vs. AMD EPYC Preliminary Test



Geometric mean based upon tests: pts/rodinia, pts/himeno, pts/x265 and pts/sysbench

This file was automatically generated via the Phoronix Test Suite benchmarking software on Saturday, 25 December 2021 20:34.