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## CC20Assignment2

Xen HVM domU 4.2.amazon testing on Ubuntu 20.04 via the Phoronix Test Suite.

### Automated Executive Summary

*t2.2xlarge had the most wins, coming in first place for 77% of the tests.*

*Based on the geometric mean of all complete results, the fastest (t2.2xlarge) was 4.621x the speed of the slowest (a1.large). c5.large was 0.618x the speed of t2.2xlarge, t2.large was 0.82x the speed of c5.large, t2.large.second was 0.993x the speed of t2.large, m4.large was 0.727x the speed of t2.large.second, t2.micro was 0.881x the speed of m4.large, t2.micro.second was 0.988x the speed of t2.micro, a1.large was 0.679x the speed of t2.micro.second.*

### Test Systems:

#### a1.large

Processor: ARMv8 Cortex-A72 (2 Cores), Motherboard: Amazon EC2 a1.large (1.0 BIOS), Chipset: Amazon Device 0200, Memory: 4096MB, Disk: 9GB Amazon Elastic Block Store, Network: Amazon Elastic

OS: Ubuntu 20.04, Kernel: 5.4.0-1038-aws (aarch64), Compiler: GCC 9.3.0, File-System: ext4

Kernel Notes: Transparent Huge Pages: madvise  
Compiler Notes: --build=aarch64-linux-gnu --disable-libquadmath --disable-libquadmath-support --disable-werror --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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --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-default-libstdcxx-abi=new --with-gcc-major-version-only --with-target-system-zlib=auto -v  
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 + srbds: Not affected + tsx\_async\_abort: Not affected

## t2.large

Processor: Intel Xeon E5-2686 v4 (2 Cores), Motherboard: Xen HVM domU (4.2.amazon BIOS), Chipset: Intel 440FX 82441FX PMC, Memory: 8GB, Disk: 8GB, Graphics: Cirrus Logic GD 5446

OS: Ubuntu 20.04, Kernel: 5.4.0-1038-aws (x86\_64), Compiler: GCC 9.3.0, File-System: ext4, System Layer: Xen HVM domU 4.2.amazon

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-HskZEA/gcc-9-9.3.0/debian/tmp-nvptx/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  
Processor Notes: CPU Microcode: 0xb000038

Security Notes: itlb\_multihit: KVM: Vulnerable + l1tf: Mitigation of PTE Inversion + mds: Vulnerable: Clear buffers attempted no microcode; SMT Host state unknown + meltdown: Mitigation of PTI + spec\_store\_bypass: Vulnerable + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retpoline STIBP: disabled RSB filling + srbds: Not affected + tsx\_async\_abort: Not affected

## m4.large

Processor: Intel Xeon E5-2686 v4 (1 Core / 2 Threads), Motherboard: Xen HVM domU (4.2.amazon BIOS), Chipset: Intel 440FX 82441FX PMC, Memory: 8GB, Disk: 8GB, Graphics: Cirrus Logic GD 5446, Network: Intel 82599 Virtual Function

OS: Ubuntu 20.04, Kernel: 5.4.0-1041-aws (x86\_64), Compiler: GCC 9.3.0, File-System: ext4, System Layer: Xen HVM domU 4.2.amazon

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-HskZEA/gcc-9-9.3.0/debian/tmp-nvptx/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  
Processor Notes: CPU Microcode: 0xb000038

Security Notes: itlb\_multihit: KVM: Vulnerable + l1tf: Mitigation of PTE Inversion + mds: Vulnerable: Clear buffers attempted no microcode; SMT Host state unknown + meltdown: Mitigation of PTI + spec\_store\_bypass: Vulnerable + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retpoline STIBP: disabled RSB filling + srbds: Not affected + tsx\_async\_abort: Not affected

## t2.2xlarge

Processor: Intel Xeon E5-2686 v4 (8 Cores), Motherboard: Xen HVM domU (4.2.amazon BIOS), Chipset: Intel 440FX 82441FX PMC, Memory: 32GB, Disk: 8GB, Graphics: Cirrus Logic GD 5446

OS: Ubuntu 20.04, Kernel: 5.4.0-1041-aws (x86\_64), Compiler: GCC 9.3.0, File-System: ext4, System Layer: Xen HVM domU 4.2.amazon

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-HskZEA/gcc-9-9.3.0/debian/tmp-nvptx/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

Processor Notes: CPU Microcode: 0xb000038

Security Notes: itlb\_multihit: KVM: Vulnerable + l1tf: Mitigation of PTE Inversion + mds: Vulnerable: Clear buffers attempted no microcode; SMT Host state unknown + meltdown: Mitigation of PTI + spec\_store\_bypass: Vulnerable + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retrpoline STIBP: disabled RSB filling + srbs: Not affected + tsx\_async\_abort: Not affected

## c5.large

Processor: Intel Xeon Platinum 8124M (1 Core / 2 Threads), Motherboard: Amazon EC2 c5.large (1.0 BIOS), Chipset: Intel 440FX 82441FX PMC, Memory: 4096MB, Disk: 9GB Amazon Elastic Block Store, Network: Amazon Elastic

OS: Ubuntu 20.04, Kernel: 5.4.0-1038-aws (x86\_64), Compiler: GCC 9.3.0, File-System: ext4, System Layer: KVM

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-HskZEA/gcc-9-9.3.0/debian/tmp-nvptx/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

Processor Notes: CPU Microcode: 0x2006906

Security Notes: itlb\_multihit: KVM: Vulnerable + l1tf: Mitigation of PTE Inversion + mds: Vulnerable: Clear buffers attempted no microcode; SMT Host state unknown + meltdown: Mitigation of PTI + spec\_store\_bypass: Vulnerable + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retrpoline STIBP: disabled RSB filling + srbs: Not affected + tsx\_async\_abort: Vulnerable: Clear buffers attempted no microcode; SMT Host state unknown

## t2.micro

Processor: Intel Xeon E5-2676 v3 (1 Core), Motherboard: Xen HVM domU (4.2.amazon BIOS), Chipset: Intel 440FX 82441FX PMC, Memory: 1024MB, Disk: 8GB, Graphics: Cirrus Logic GD 5446

OS: Ubuntu 20.04, Kernel: 5.4.0-1038-aws (x86\_64), Compiler: GCC 9.3.0, File-System: ext4, System Layer: Xen HVM domU 4.2.amazon

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-HskZEA/gcc-9-9.3.0/debian/tmp-nvptx/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

Processor Notes: CPU Microcode: 0x44

Security Notes: itlb\_multihit: KVM: Vulnerable + l1tf: Mitigation of PTE Inversion + mds: Vulnerable: Clear buffers attempted no microcode; SMT Host state unknown + meltdown: Mitigation of PTI + spec\_store\_bypass: Vulnerable + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retrpoline STIBP: disabled RSB filling + srbs: Not affected + tsx\_async\_abort: Not affected

## t2.large.second

Processor: Intel Xeon E5-2686 v4 (2 Cores), Motherboard: Xen HVM domU (4.2.amazon BIOS), Chipset: Intel 440FX 82441FX PMC, Memory: 8GB, Disk: 8GB, Graphics: Cirrus Logic GD 5446

OS: Ubuntu 20.04, Kernel: 5.4.0-1038-aws (x86\_64), Compiler: GCC 9.3.0, File-System: ext4, System Layer: Xen HVM domU 4.2.amazon

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++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-HskZEA/gcc-9-9.3.0/debian/tmp-nvptx/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

Processor Notes: CPU Microcode: 0xb000038

Security Notes: itlb\_multihit: KVM: Vulnerable + l1tf: Mitigation of PTE Inversion + mds: Vulnerable: Clear buffers attempted no microcode; SMT Host state unknown + meltdown: Mitigation of PTI + spec\_store\_bypass: Vulnerable + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retrpoline STIBP: disabled RSB filling + srbs: Not affected + tsx\_async\_abort: Not affected

## t2.micro.second

Processor: Intel Xeon E5-2676 v3 (1 Core), Motherboard: Xen HVM domU (4.2.amazon BIOS), Chipset: Intel 440FX

82441FX PMC, Memory: 1024MB, Disk: 8GB, Graphics: Cirrus Logic GD 5446

OS: Ubuntu 20.04, Kernel: 5.4.0-1038-aws (x86\_64), Compiler: GCC 9.3.0, File-System: ext4, System Layer: Xen HVM domU 4.2.amazon

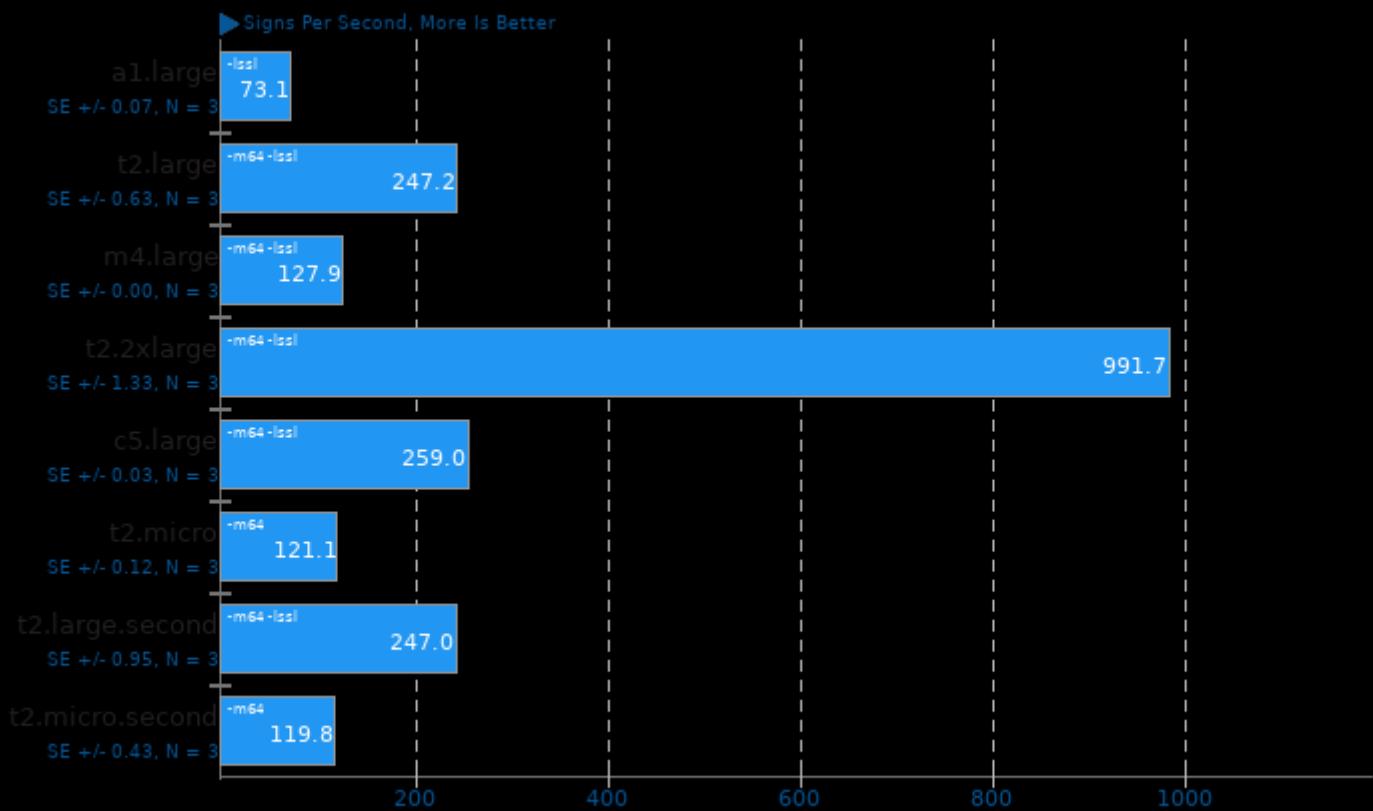
Kernel Notes: Transparent Huge Pages: madvise  
 Compiler Notes: --build=x86\_64-linux-gnu --disable-vtable-verify --disable-werror --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-gnu-unique-object --enable-languages=c,ada,c++,go,brig,d,fortran,objc,obj-c++,gm2 --enable-libstdcxx-debug --enable-libstdcxx-time=yes --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-9-HskZEa/gcc-9-9.3.0/debian/tmp-nvptx/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  
 Processor Notes: CPU Microcode: 0x44

Security Notes: itlb\_multihit: KVM: Vulnerable + l1tf: Mitigation of PTE Inversion + mds: Vulnerable: Clear buffers attempted no microcode; SMT Host state unknown + meltdown: Mitigation of PTI + spec\_store\_bypass: Vulnerable + spectre\_v1: Mitigation of usercopy/swapgs barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retpoline STIBP: disabled RSB filling + srbsd: Not affected + tsx\_async\_abort: Not affected

	a1.large	t2.large	m4.large	t2.2xlarge	c5.large	t2.micro	t2.large.se cond	t2.micro.se cond
<b>OpenSSL - R.4.b.P (Signs/sec)</b>	<b>73.1</b>	247.2	127.9	<b>991.7</b>	259.0	121.1	247.0	119.8
Normalized	7.37%	24.93%	12.9%	100%	26.12%	12.21%	24.91%	12.08%
Standard Deviation	0.2%	0.4%	0%	0.2%	0%	0.2%	0.7%	0.6%
<b>Stream - Copy (MB/s)</b>	<b>11259</b>	24943	17648	<b>39496</b>	11692		32763	
Normalized	28.51%	63.15%	44.68%	100%	29.6%		82.95%	
Standard Deviation	0.2%	0.3%	0.5%	2.4%	0.1%		0.6%	
<b>Stream - Scale (MB/s)</b>	<b>11220</b>	14893	<b>8989</b>	<b>37266</b>	13431		17495	
Normalized	30.11%	39.96%	24.12%	100%	36.04%		46.95%	
Standard Deviation	0.1%	0.3%	0.3%	1.1%	0.3%		0.3%	
<b>Stream - Triad (MB/s)</b>	<b>11633</b>	15882	<b>9659</b>	<b>35134</b>	13748		18958	
Normalized	33.11%	45.2%	27.49%	100%	39.13%		53.96%	
Standard Deviation	0.2%	0.3%	0.1%	0.3%	0.2%		0.3%	
<b>Stream - Add (MB/s)</b>	<b>11743</b>	15863	<b>9648</b>	<b>34961</b>	13717		18980	
Normalized	33.59%	45.37%	27.6%	100%	39.23%		54.29%	
Standard Deviation	0.9%	0.7%	0.1%	0.2%	0.3%		0.4%	
<b>LAME MP3 Encoding - WAV To MP3 (sec)</b>	<b>19.041</b>	13.439	13.419	13.480	<b>10.902</b>	14.082	13.465	14.192
Normalized	57.26%	81.12%	81.24%	80.88%	100%	77.42%	80.97%	76.82%
Standard Deviation	2.3%	0.1%	0.2%	0.5%	0.1%	0.5%	0.4%	0.2%
<b>Apache Benchmark - S.W.P.S (Reqs/sec)</b>	<b>5302</b>	8590	6592	<b>15518</b>	12200	4961	8347	<b>4809</b>
Normalized	34.17%	55.36%	42.48%	100%	78.62%	31.97%	53.79%	30.99%
Standard Deviation	0.4%	2.2%	0.8%	0.1%	1%	1.9%	0.5%	1.6%
<b>Loopback TCP Network Performance - T.T.T.1.V.L (sec)</b>	<b>28.166</b>	17.306	19.325	16.618	<b>15.465</b>	22.410	17.387	22.575
Normalized	54.91%	89.36%	80.03%	93.06%	100%	69.01%	88.95%	68.5%
Standard Deviation	2.5%	0.7%	0.7%	0.5%	4.3%	0%	0.4%	0.1%
<b>John The Ripper - MD5 (Real C/S)</b>	<b>24462</b>	136610	75328	<b>542352</b>	179349	68138	136554	68071
Normalized	4.51%	25.19%	13.89%	100%	33.07%	12.56%	25.18%	12.55%
Standard Deviation	0%	0.1%	0.1%	0.1%	0.1%	0.6%	0.5%	0.7%

## OpenSSL 1.1.1

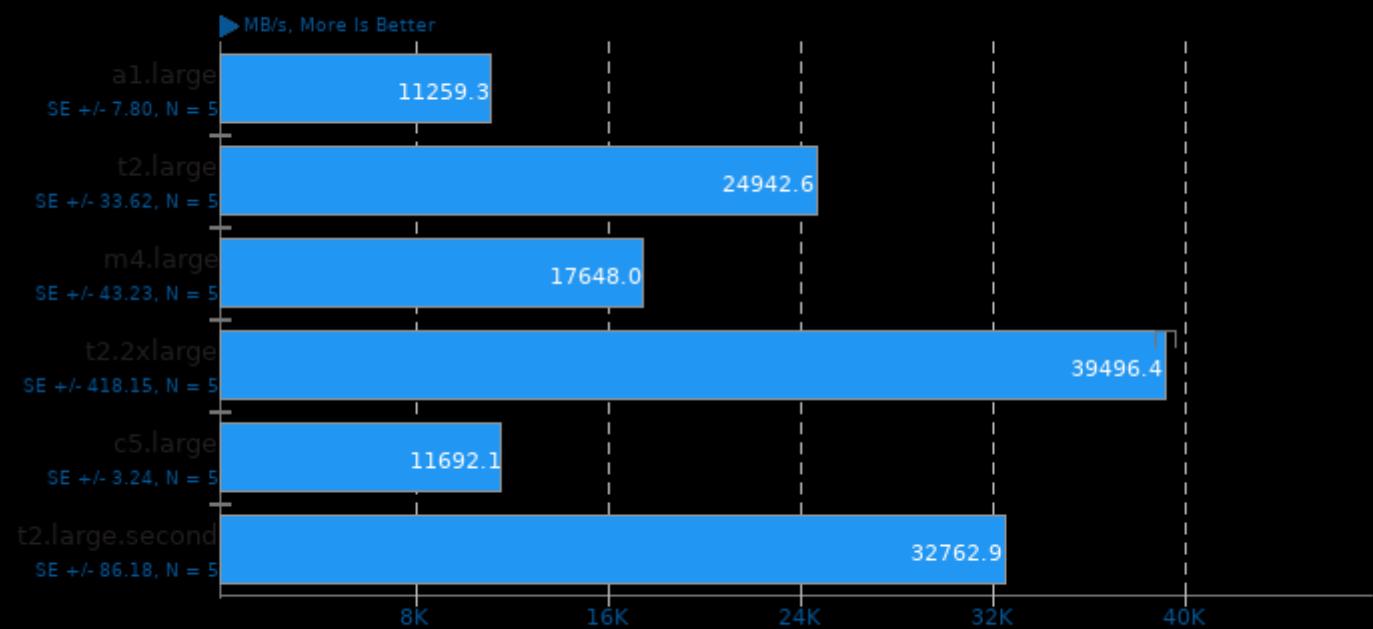
RSA 4096-bit Performance



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

## Stream 2013-01-17

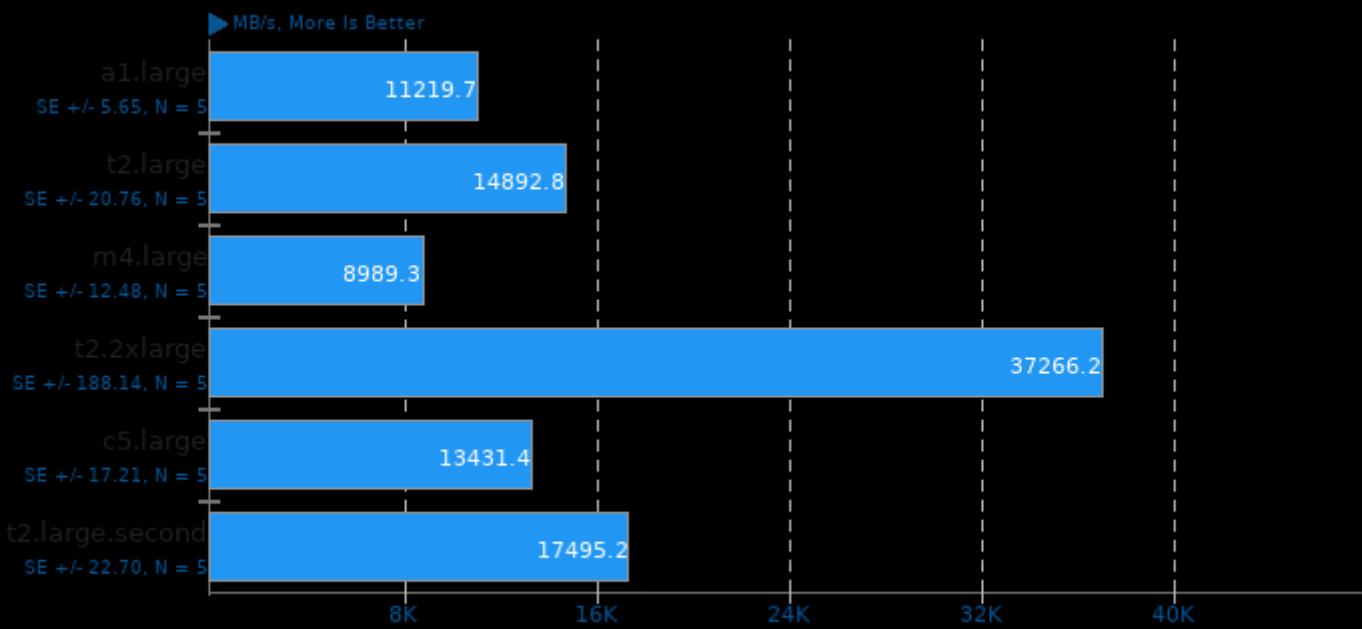
Type: Copy



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

## Stream 2013-01-17

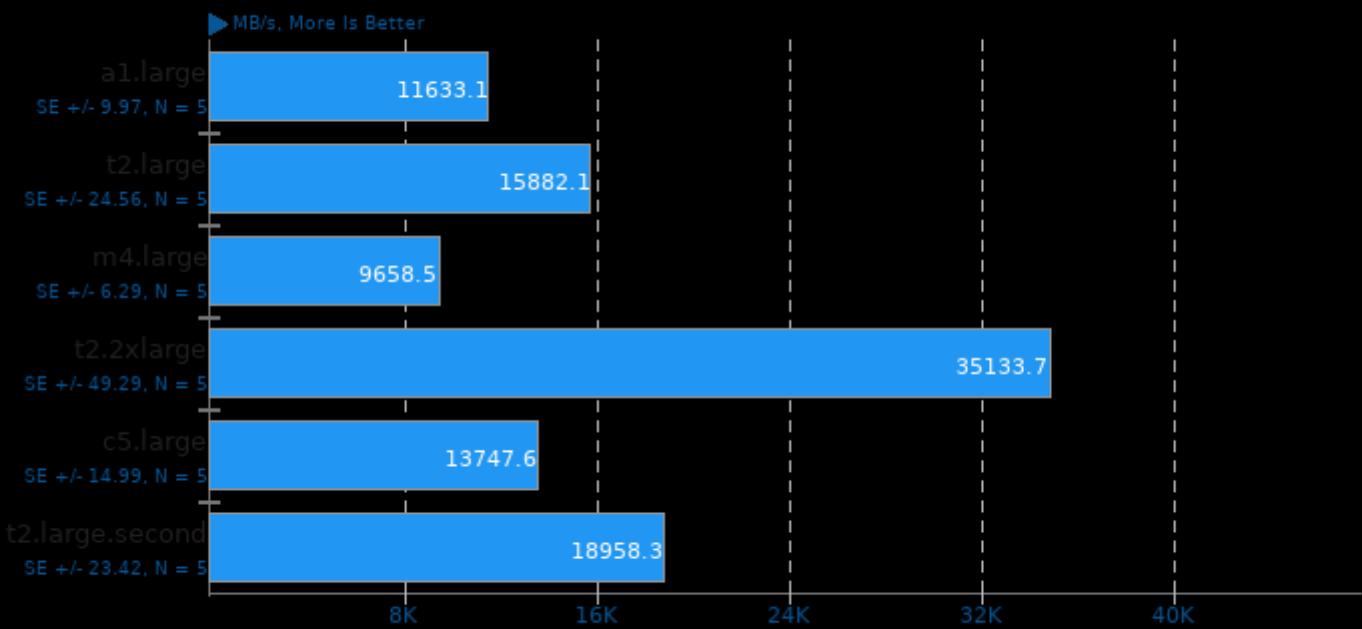
Type: Scale



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

## Stream 2013-01-17

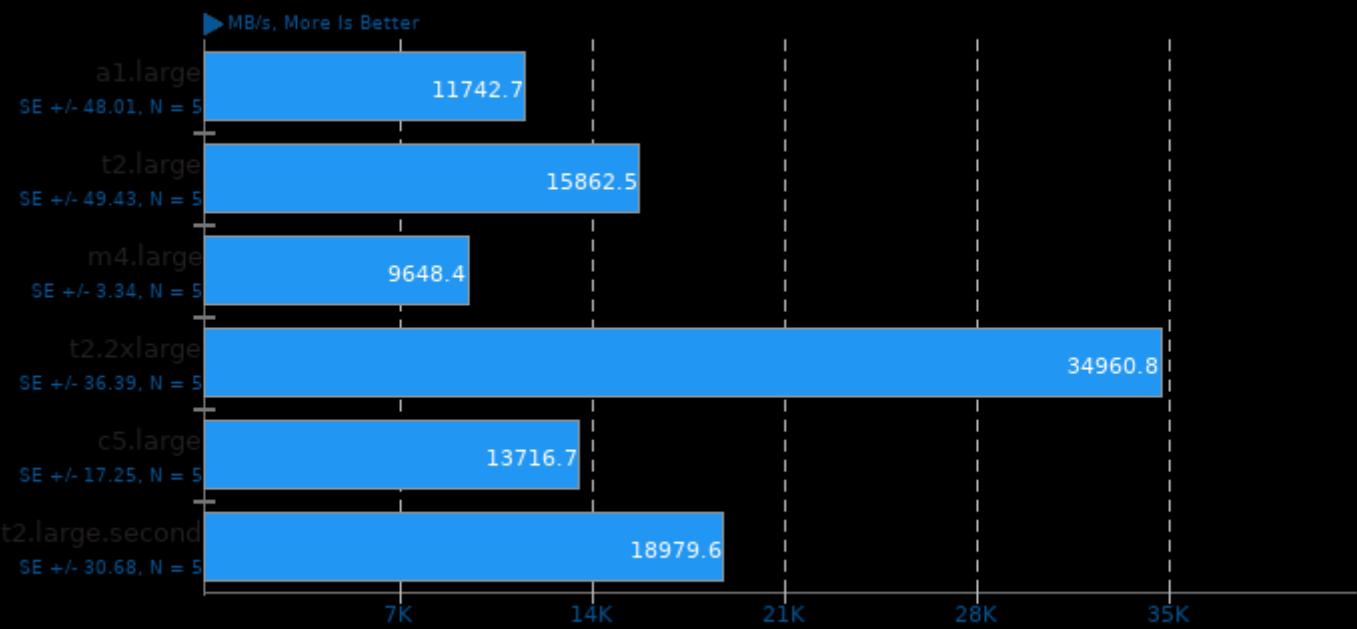
Type: Triad



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

## Stream 2013-01-17

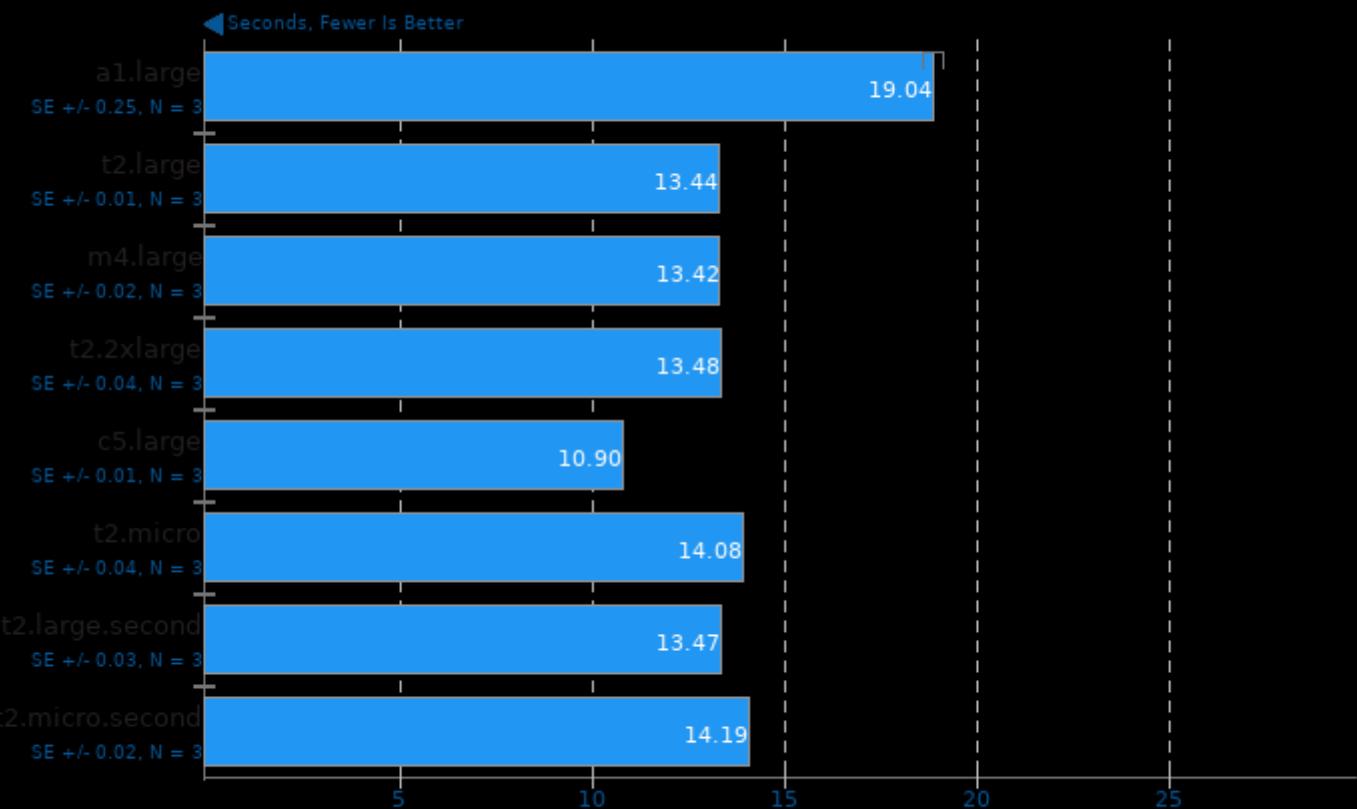
Type: Add



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

## 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 -lm

## Apache Benchmark 2.4.29

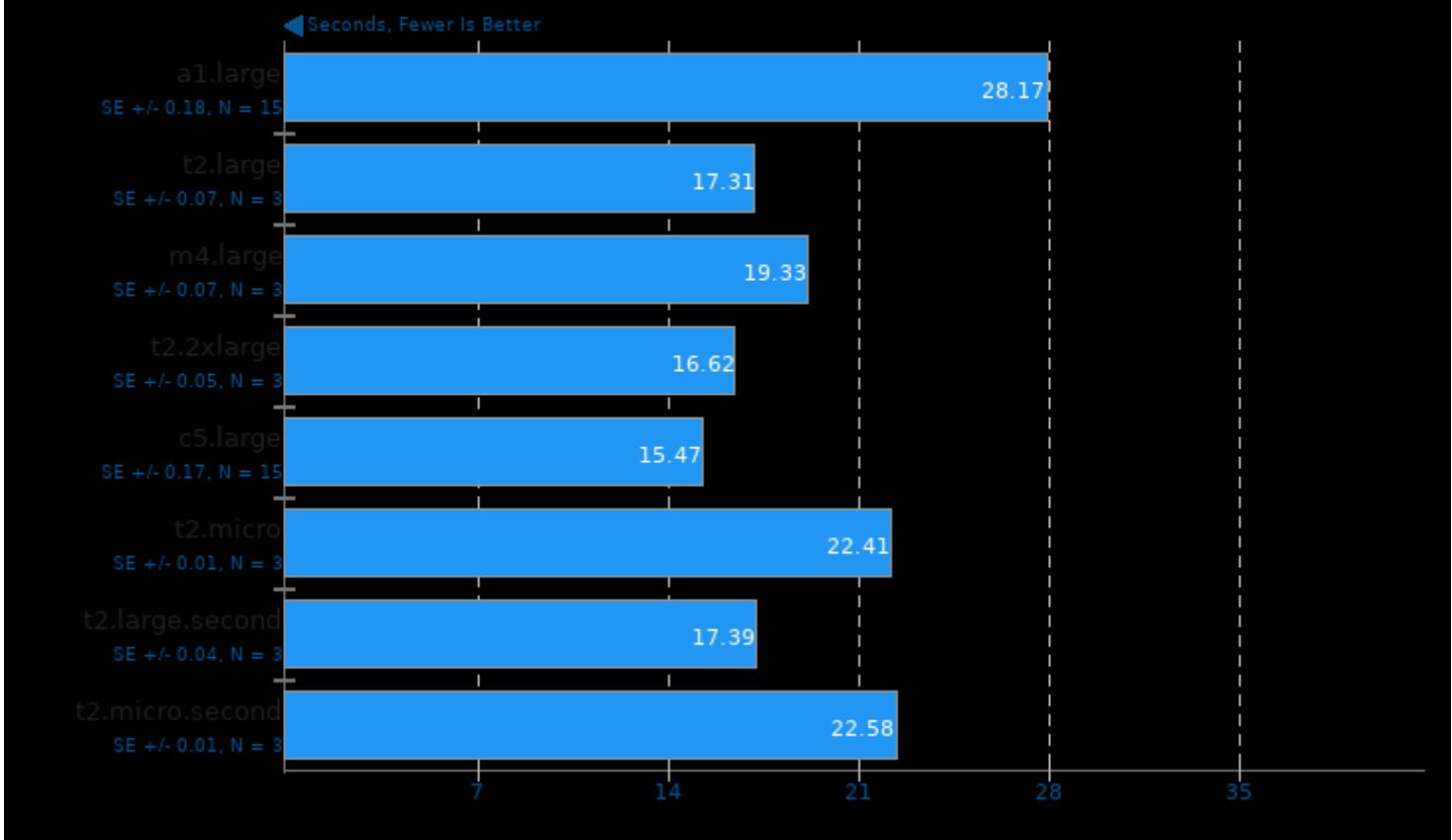
Static Web Page Serving



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

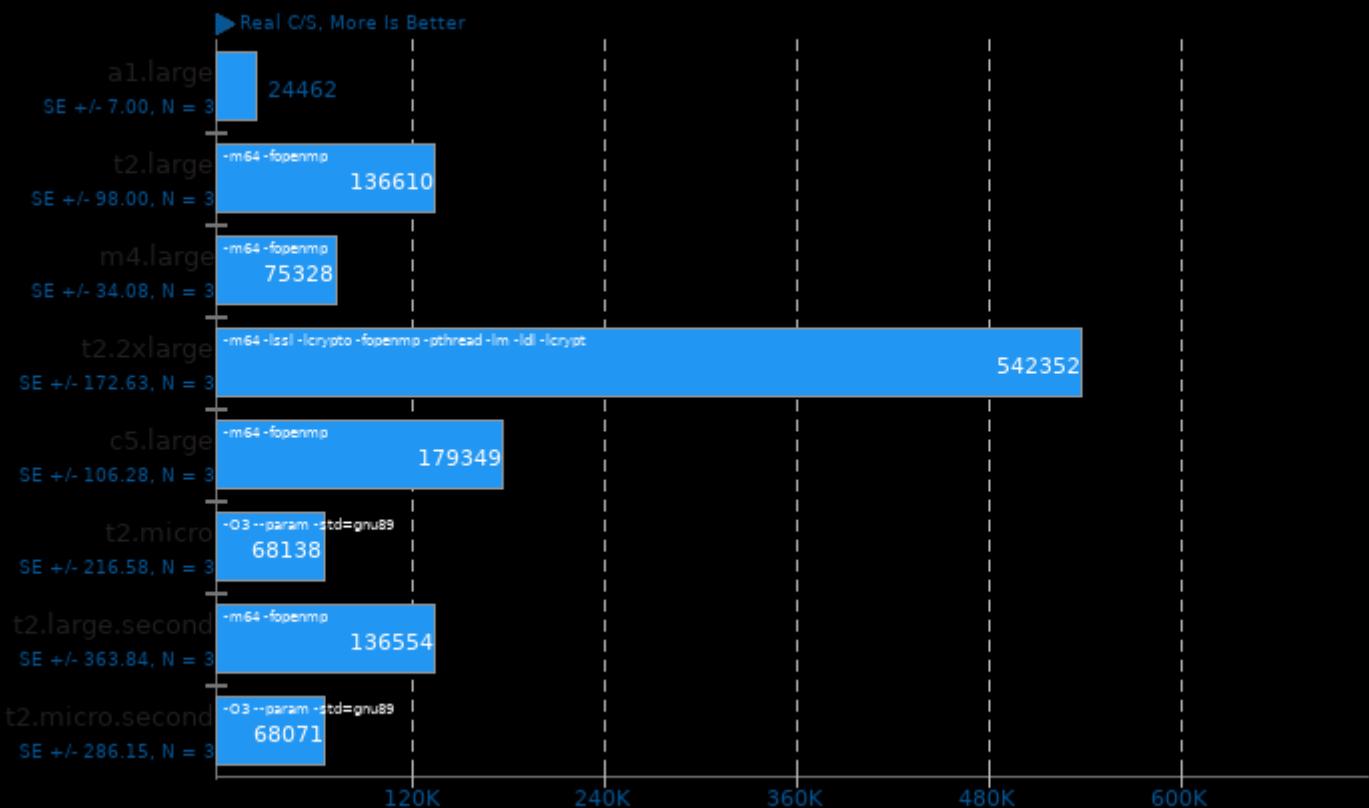
## Loopback TCP Network Performance

Time To Transfer 10GB Via Loopback



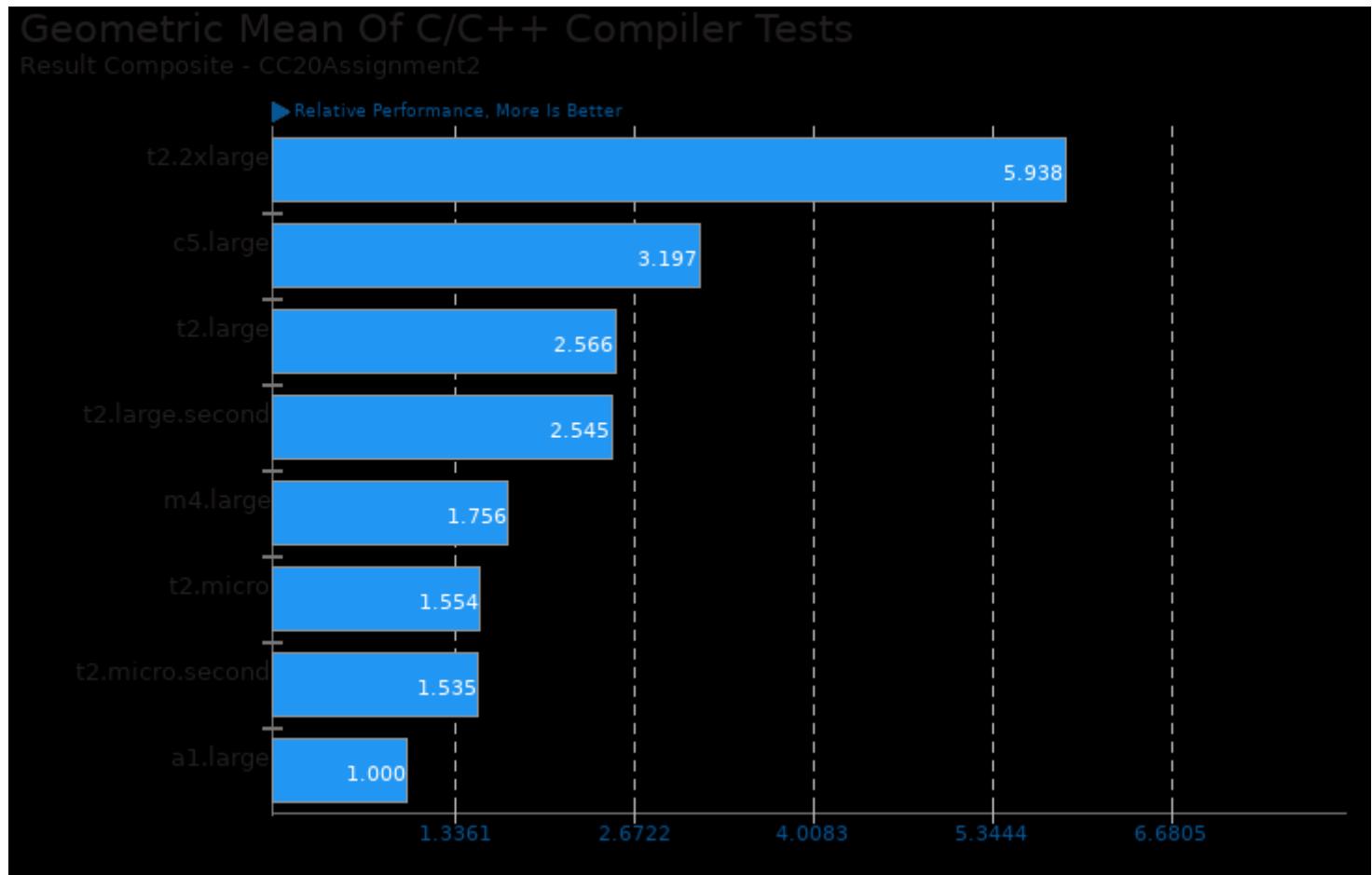
## John The Ripper 1.9.0-jumbo-1

Test: MD5



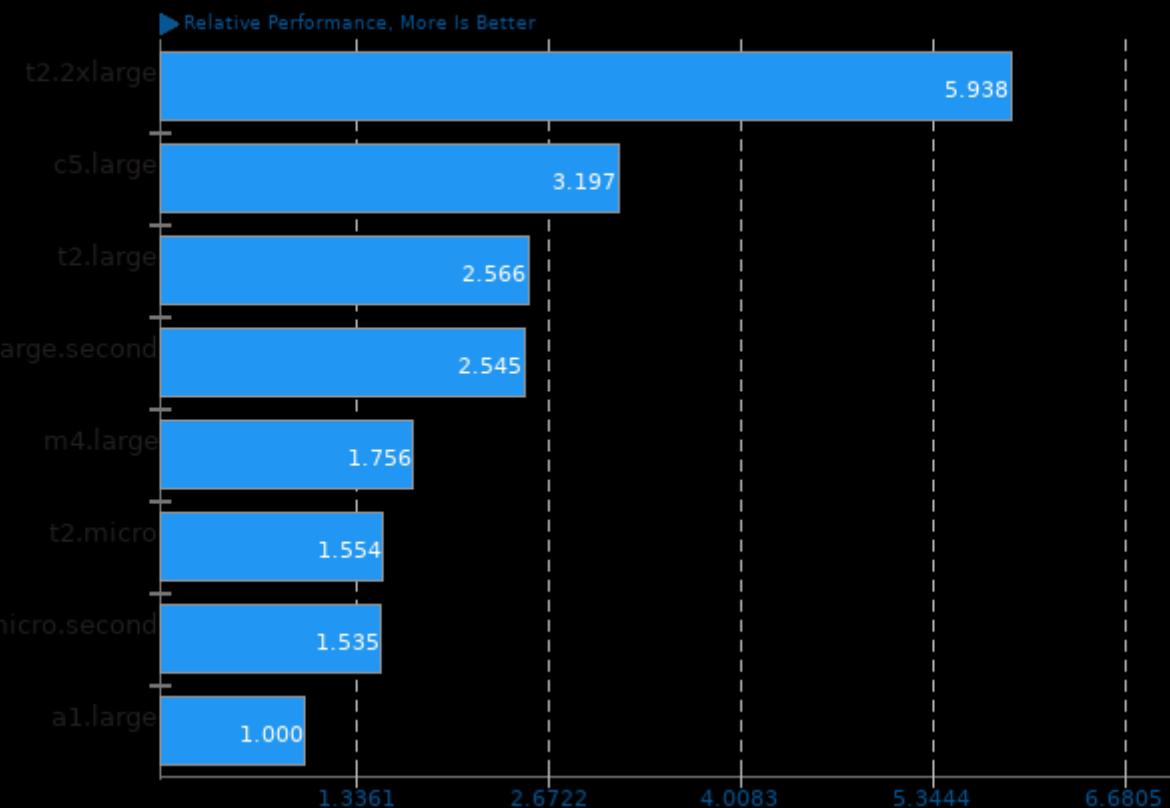
1. (CC) gcc options:

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



## Geometric Mean Of CPU Massive Tests

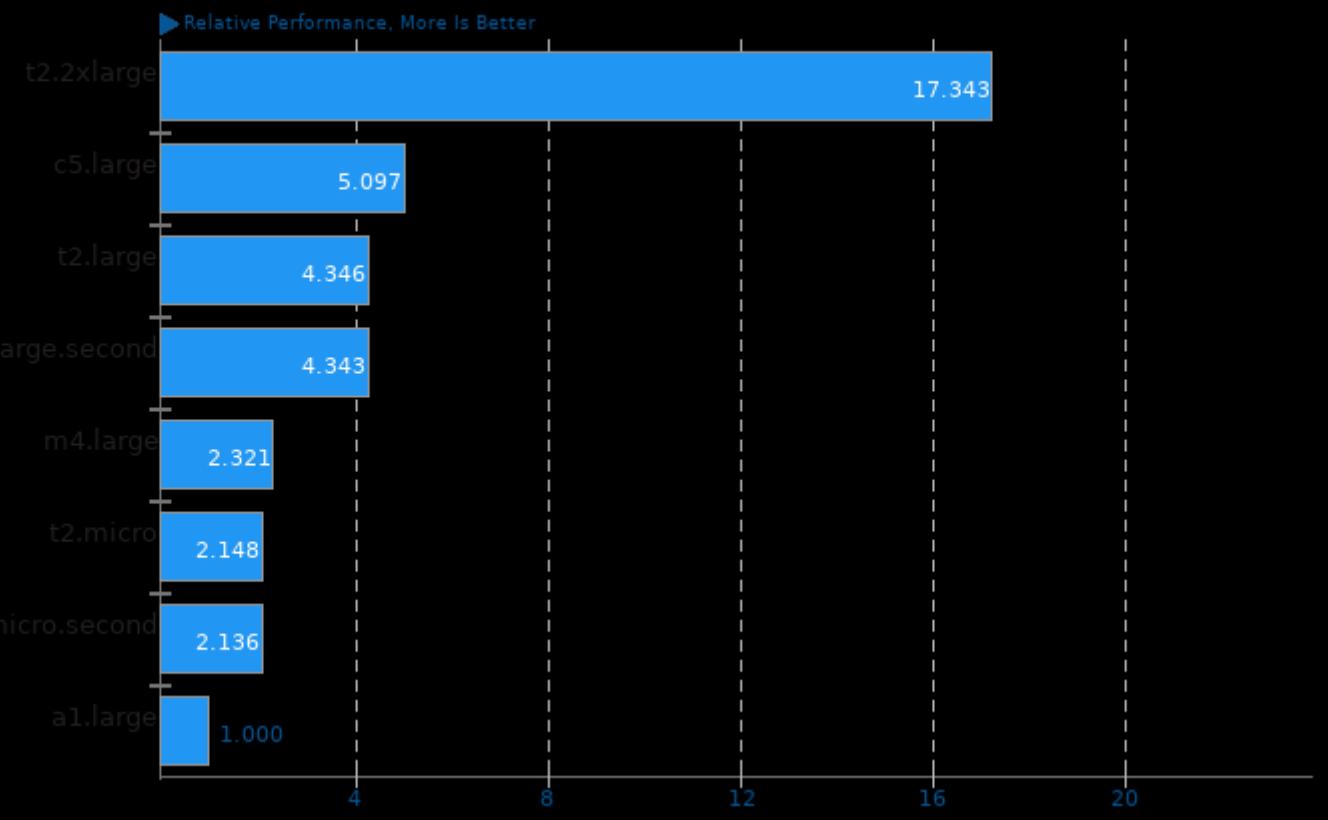
Result Composite - CC20Assignment2



Geometric mean based upon tests: pts/apache, pts/encode-mp3, pts/john-the-ripper, pts/openssl and pts/stream

## Geometric Mean Of Cryptography Tests

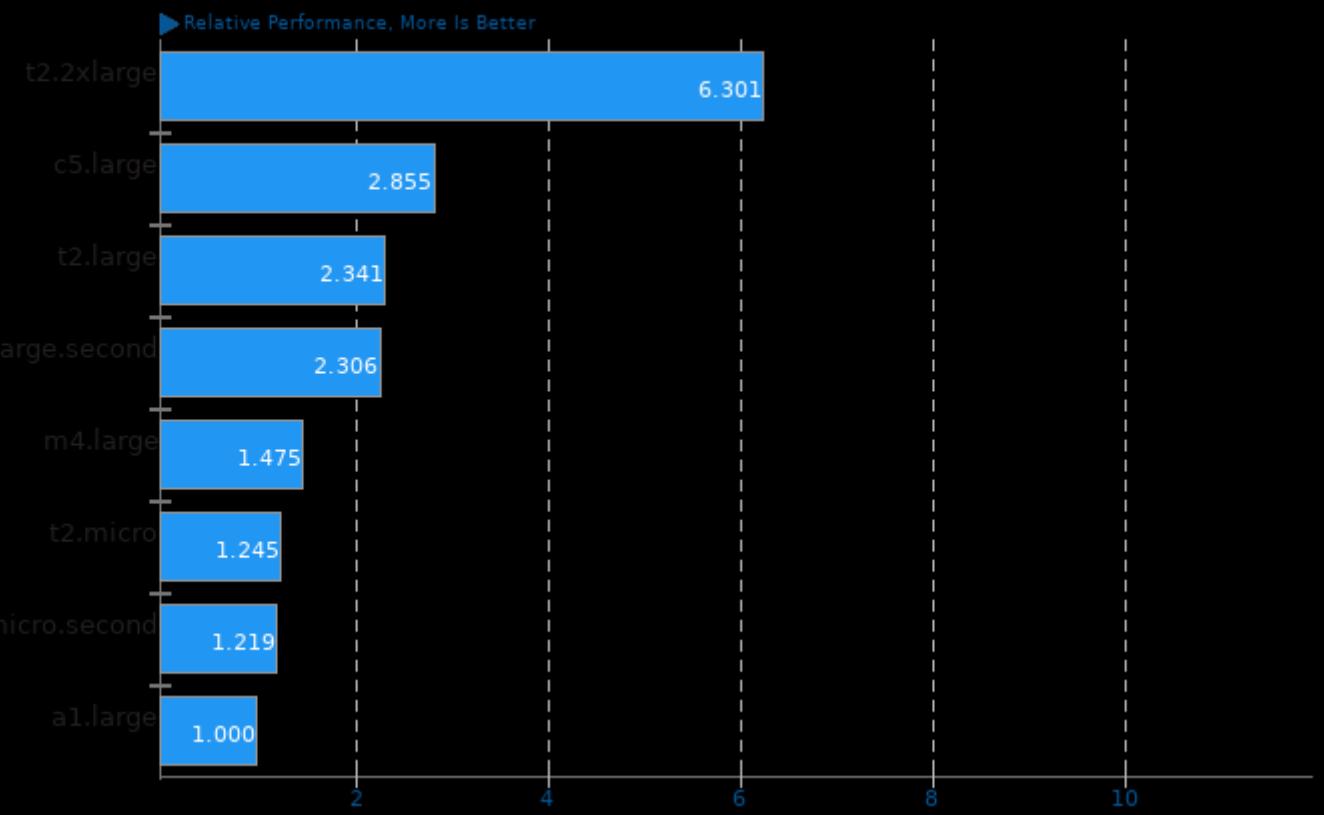
Result Composite - CC20Assignment2



Geometric mean based upon tests: pts/openssl and pts/john-the-ripper

## Geometric Mean Of Common Kernel Benchmarks Tests

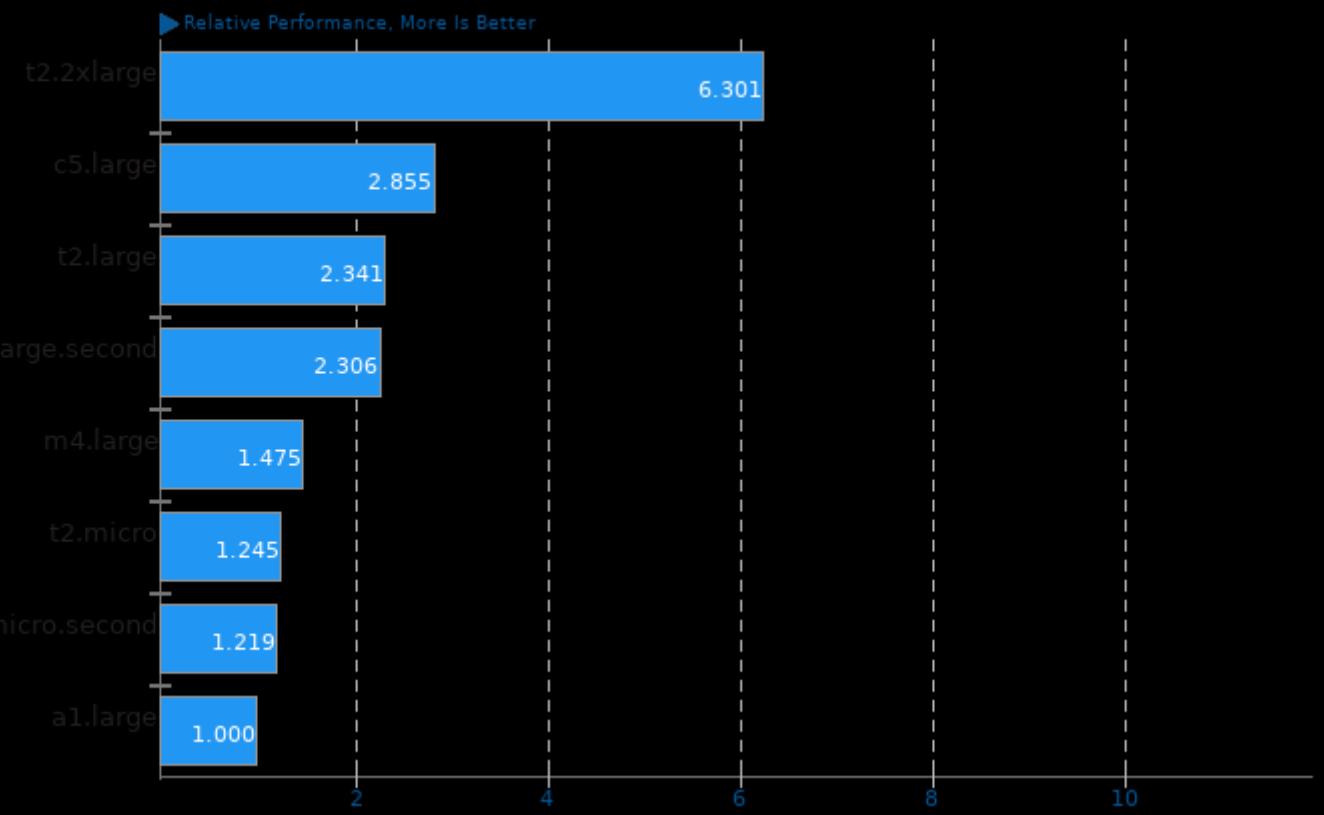
Result Composite - CC20Assignment2



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

## Geometric Mean Of Server Tests

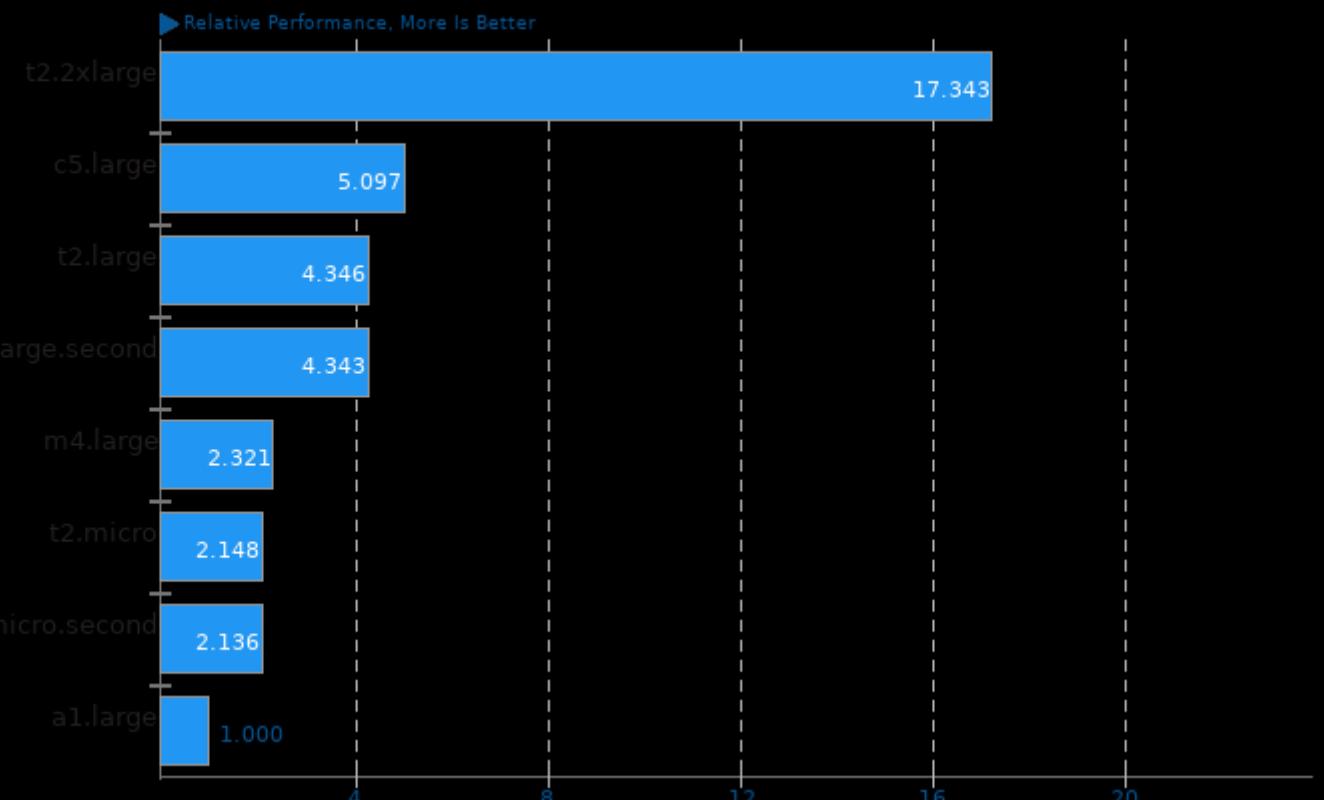
Result Composite - CC20Assignment2



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

## Geometric Mean Of Server CPU Tests

Result Composite - CC20Assignment2



Geometric mean based upon tests: pts/john-the-ripper, pts/openssl and pts/stream

*This file was automatically generated via the Phoronix Test Suite benchmarking software on Friday, 29 March 2024 07:59.*