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## Lenovo Kernel

Intel Core i3-3110M testing with a LENOVO (78CN25WWV2.03 BIOS) and Intel 3rd Gen Core on Gentoo/Linux via the Phoronix Test Suite.

### Automated Executive Summary

*Gentoo -miti 5.12-Stock GCC 10.2 had the most wins, coming in first place for 42% of the tests.*

## Test Systems:

### Ubuntu 21.04 -miti GCC 10.3

Processor: Intel Core i3-3110M @ 2.40GHz (2 Cores / 4 Threads), Motherboard: LENOVO (78CN25WWV2.03 BIOS), Chipset: Intel 3rd Gen Core DRAM, Memory: 8GB, Disk: 1000GB Samsung SSD 860, Graphics: Intel HD 4000 2GB (1000MHz), Audio: Conexant CX20757, Network: Qualcomm Atheros QCA8172 + Intel Centrino-N 135

OS: Ubuntu 21.04, Kernel: 5.11.0-16-generic (x86\_64), Desktop: MATE 1.24.1, Display Server: X Server 1.20.11, OpenGL: 4.2 Mesa 21.0.1, Vulkan: 1.2.145, Compiler: GCC 10.3.0 + Clang 12.0.0-1ubuntu1 + LLVM 12.0.0,

File-System: zfs, Screen Resolution: 1366x768

Kernel Notes: Transparent Huge Pages: madvise  
 Compiler Notes: --build=x86\_64-linux-gnu --disable-vtable-verify --disable-werror --enable-bootstrap --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-mutex --enable-multiarch --enable-multilib --enable-nls --enable-objc-gc=auto --enable-offload-targets=nvptx-none=/build/gcc-10-gDeRY6/gcc-10-10.3.0/debian/tmp-nvptx/usr,armdgn-amdhsa=/build/gcc-10-gDeRY6/gcc-10-10.3.0/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-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: Scaling Governor: intel\_cpf freq performance - CPU Microcode: 0x21 - ThermalD 2.4.3  
 Disk Scheduler Notes: NONE  
 Python Notes: Python 3.9.4  
 Security Notes: iflb\_multithit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + 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 generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling + srbs: Not affected + tsx\_async\_abort: Not affected

## ClearLinux 34600 miti GCC 11.1

Processor: Intel Core i3-3110M @ 2.40GHz (2 Cores / 4 Threads), Motherboard: LENOVO (78CN25WWV2.03 BIOS), Chipset: Intel 3rd Gen Core DRAM, Memory: 8GB, Disk: 1000GB Samsung SSD 860, Graphics: Intel HD 4000 2GB (1000MHz), Audio: Conexant CX20757, Network: Qualcomm Atheros QCA8172 + Intel Centrino-N 135

OS: Clear Linux OS 34600, Kernel: 5.12.2-1038.native (x86\_64), Desktop: GNOME Shell 40.0, Display Server: X Server 1.20.11, OpenGL: 4.2 Mesa 21.1.0, Vulkan: 1.2.168, Compiler: GCC 11.1.1 20210507 releases/gcc-11.1.0-76-g3068b39d12 + Clang 11.1.0 + LLVM 11.1.0, File-System: ext4, Screen Resolution: 1366x768

Kernel Notes: Transparent Huge Pages: always  
 Environment Notes: FFLAGS="-g -O3 -feliminate-unused-debug-types -pipe -Wall -Wp,-D\_FORTIFY\_SOURCE=2 -fexceptions -fstack-protector --param=ssp-buffer-size=32 -m64 -fasynchronous-unwind-tables -Wp,-D\_REENTRANT -ffree-loop-distribute-patterns -WI,-z -WI,now -WI,-z -WI,retro -malign-data=abi -fno-semantic-interposition -ffree-vectorize -ffree-loop-vectorize -WI,--enable-new-dtags -Wa,-mbranches-within-32B-boundaries" CXXFLAGS="-g -O3 -feliminate-unused-debug-types -pipe -Wall -Wp,-D\_FORTIFY\_SOURCE=2 -fexceptions -fstack-protector --param=ssp-buffer-size=32 -Wformat -Wformat-security -m64 -fasynchronous-unwind-tables -Wp,-D\_REENTRANT -ffree-loop-distribute-patterns -WI,-z -WI,now -WI,-z -WI,retro -fno-semantic-interposition -ffat-lto-objects -fno-trapping-math -WI,-sort-common -WI,--enable-new-dtags -mtune=skylake -Wa,-mbranches-within-32B-boundaries -fvisibility-inlines-hidden -WI,--enable-new-dtags" MESA\_GLSL\_CACHE\_DISABLE=0 FCFLAGS="-g -O3 -feliminate-unused-debug-types -pipe -Wall -Wp,-D\_FORTIFY\_SOURCE=2 -fexceptions -fstack-protector --param=ssp-buffer-size=32 -m64 -fasynchronous-unwind-tables -Wp,-D\_REENTRANT -ffree-loop-distribute-patterns -WI,-z -WI,now -WI,-z -WI,retro -malign-data=abi -fno-semantic-interposition -ffree-vectorize -ffree-loop-vectorize -WI,-sort-common -WI,--enable-new-dtags" CFLAGS="-g -O3 -feliminate-unused-debug-types -pipe -Wall -Wp,-D\_FORTIFY\_SOURCE=2 -fexceptions -fstack-protector --param=ssp-buffer-size=32 -Wformat -Wformat-security -m64 -fasynchronous-unwind-tables -Wp,-D\_REENTRANT -ffree-loop-distribute-patterns -WI,-z -WI,now -WI,-z -WI,retro -fno-semantic-interposition -ffat-lto-objects -fno-trapping-math -WI,-sort-common -WI,--enable-new-dtags -mtune=skylake -Wa,-mbranches-within-32B-boundaries" THEANO\_FLAGS="floatX=float32,openmp=true,gcc.cxxflags=-ffree-vectorize -mavx" Compiler Notes: --build=x86\_64-generic-linux --disable-libmpx --disable-libunwind-exceptions --disable-multiarch --disable-vtable-verify --disable-werror --enable\_cxa\_atexit --enable-bootstrap --enable-cet --enable-clocale=gnu --enable-default-pie --enable-gnu-indirect-function --enable-languages=c,c++,fortran,go --enable-ld=default --enable-libstdcxx-pch --enable-lto --enable-multilib --enable-plugin --enable-shared --enable-threads=posix --exec-prefix=/usr --includedir=/usr/include --target=x86\_64-generic-linux --with-arch=westmere --with-gcc-major-version-only --with-glibc-version=2.19 --with-gnu-ld --with-isl --with-ppl=yes --with-tune=skylake-avx512  
 Processor Notes: Scaling Governor: intel\_cpf freq performance - CPU Microcode: 0x21 - ThermalD 2.4.4  
 Security Notes: iflb\_multithit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + 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 generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling + srbs: Not affected + tsx\_async\_abort: Not affected

## VoidLinux Musl miti GCC 10.2

pluma ./phoronix-test-suite/installed-tests/pts/mutex-1.0.0/install-failed.log

## VoidLinux Musl miti GCC 10.2 v2

Processor: Intel Core i3-3110M @ 2.40GHz (2 Cores / 4 Threads), Motherboard: LENOVO (78CN25WWV2.03 BIOS), Chipset: Intel 3rd Gen Core DRAM, Memory: 8GB, Disk: 1000GB Samsung SSD 860, Graphics: Intel HD 4000 (1000MHz), Audio: Conexant CX20757, Network: Qualcomm Atheros QCA8172 + Intel Centrino-N 135

OS: VoidLinux rolling, Kernel: 5.11.21\_1 (x86\_64), Display Server: X Server 1.20.11, Display Driver: intel 2.99.917, Compiler: GCC 10.2.1 20201203 + Clang 11.0.0 + LLVM 11.0.0, File-System: f2fs, Screen Resolution: 1366x768

Compiler Notes: --build=x86\_64-linux-musl --disable-gnu-unique-object --disable-libasanitizer --disable-libstdcxx-pch --disable-multilib --disable-nls --disable-sjlj-exceptions --disable-symvers --disable-target-liberty --disable-werror --enable-\_\_cxa\_atexit --enable-checking=release --enable-default-pie --enable-default-ssp --enable-languages=c,c++,objc,obj-c++,fortran,lto,go,ada --enable-lto --enable-plugins --enable-shared --enable-threads=posix --enable-vtable-verify --mandir=/usr/share/man --with-isl --with-linker-hash-style=gnu

Processor Notes: Scaling Governor: intel\_cpfreq schedutil - CPU Microcode: 0x21

Security Notes: itlb\_multihit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swapgs barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling + srbds: Not affected + tsx\_async\_abort: Not affected

## CentOS Stream 8 -miti 4.18 GCC 8.4

Processor: Intel Core i3-3110M @ 2.40GHz (2 Cores / 4 Threads), Motherboard: LENOVO (78CN25WWV2.03 BIOS), Chipset: Intel 3rd Gen Core DRAM, Memory: 8GB, Disk: 1000GB Samsung SSD 860, Graphics: Intel HD 4000 2GB (1000MHz), Audio: Conexant CX20757, Network: Qualcomm Atheros QCA8172 + Intel Centrino-N 135

OS: CentOS Stream 8, Kernel: 4.18.0-301.1.el8.x86\_64 (x86\_64), Desktop: GNOME Shell 3.32.2, Display Server: X Server + Wayland, OpenGL: 4.2 Mesa 20.3.3, Compiler: GCC 8.4.1 20210423 + Clang 11.0.0 + LLVM 11.0.0, File-System: xfs, Screen Resolution: 1366x768

Kernel Notes: Transparent Huge Pages: always

Processor Notes: Scaling Governor: intel\_pstate performance - CPU Microcode: 0x21

Security Notes: SELinux + itlb\_multihit: KVM: Mitigation of Split huge pages + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swapgs barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling + srbds: Not affected + tsx\_async\_abort: Not affected

## OpenMandriva LX 4.2 miti 5.11 Clang 11.0

Processor: Intel Core i3-3110M @ 2.40GHz (2 Cores / 4 Threads), Motherboard: LENOVO (78CN25WWV2.03 BIOS), Chipset: Intel 3rd Gen Core DRAM, Memory: 8GB, Disk: 1000GB Samsung SSD 860 + 8GB Flash Disk, Graphics: Intel HD 4000 2GB (1000MHz), Audio: Conexant CX20757, Network: Qualcomm Atheros QCA8172 + Intel Centrino-N 135

OS: OpenMandrivaLinux 4.2, Kernel: 5.11.12-desktop-1omv4002 (x86\_64), Desktop: KDE Plasma 5.20.5, Display Server: X Server 1.20.10, OpenGL: 4.2 Mesa 20.3.4, Vulkan: 1.0.2, Compiler: Clang 11.0.1 + GCC 10.2.1 20201205 + LLVM 11.0.1, File-System: ext4, Screen Resolution: 1366x768

Kernel Notes: dm\_mod.use\_blk\_mq=1 - Transparent Huge Pages: always

Compiler Notes: Optimized build with assertions; Default target: x86\_64-pc-linux-gnu; Host CPU: ivybridge

Processor Notes: Scaling Governor: intel\_cpfreq performance - CPU Microcode: 0x21

Security Notes: itlb\_multihit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: conditional cache flushes SMT vulnerable + mds: Mitigation of Clear buffers; SMT vulnerable + meltdown: Mitigation of PTI + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swapgs barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Full generic retpoline IBPB: conditional IBRS\_FW STIBP: conditional RSB filling + srbds: Not affected + tsx\_async\_abort: Not affected

## Gentoo -miti 5.12-Stock GCC 10.2

Processor: Intel Core i3-3110M @ 2.40GHz (2 Cores / 4 Threads), Motherboard: LENOVO (78CN25WWV2.03 BIOS), Chipset: Intel 3rd Gen Core DRAM, Memory: 8GB, Disk: 1000GB Samsung SSD 860, Graphics: Intel 3rd Gen Core (1000MHz), Audio: Conexant CX20757, Network: Qualcomm Atheros QCA8172 + Intel Centrino-N 135

OS: Gentoo/Linux, Kernel: 5.12.8-gentoo-dist (x86\_64), Desktop: MATE 1.24.0, Display Server: X Server 1.20.11, Compiler: GCC 10.2.0 + Clang 11.1.0 + LLVM 11.1.0, File-System: btrfs, Screen Resolution: 1366x768

Kernel Notes: Transparent Huge Pages: madvise

Processor Notes: Scaling Governor: intel\_cpfreq performance - CPU Microcode: 0x21

Security Notes: itlb\_multihit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: vulnerable + mds: Vulnerable; SMT vulnerable + meltdown: Vulnerable + spec\_store\_bypass: Vulnerable + spectre\_v1: Vulnerable: \_\_user pointer sanitization and usercopy barriers only; no swapgs barriers + spectre\_v2: Vulnerable IBPB: disabled STIBP: disabled + srbds: Not affected + tsx\_async\_abort: Not affected

## Gentoo -miti 5.12-native GCC 10.2

Processor: Intel Core i3-3110M @ 2.40GHz (2 Cores / 4 Threads), Motherboard: LENOVO (78CN25WWV2.03 BIOS), Chipset: Intel 3rd Gen Core DRAM, Memory: 8GB, Disk: 1000GB Samsung SSD 860, Graphics: Intel 3rd Gen Core (1000MHz), Audio: Conexant CX20757, Network: Qualcomm Atheros QCA8172 + Intel Centrino-N 135

OS: Gentoo/Linux, Kernel: 5.12.8-gentoo-x86\_64-gcc (x86\_64), Desktop: MATE 1.24.0, Display Server: X Server 1.20.11, Compiler: GCC 10.2.0 + Clang 11.1.0 + LLVM 11.1.0, File-System: btrfs, Screen Resolution: 1366x768

Kernel Notes: Transparent Huge Pages: madvise

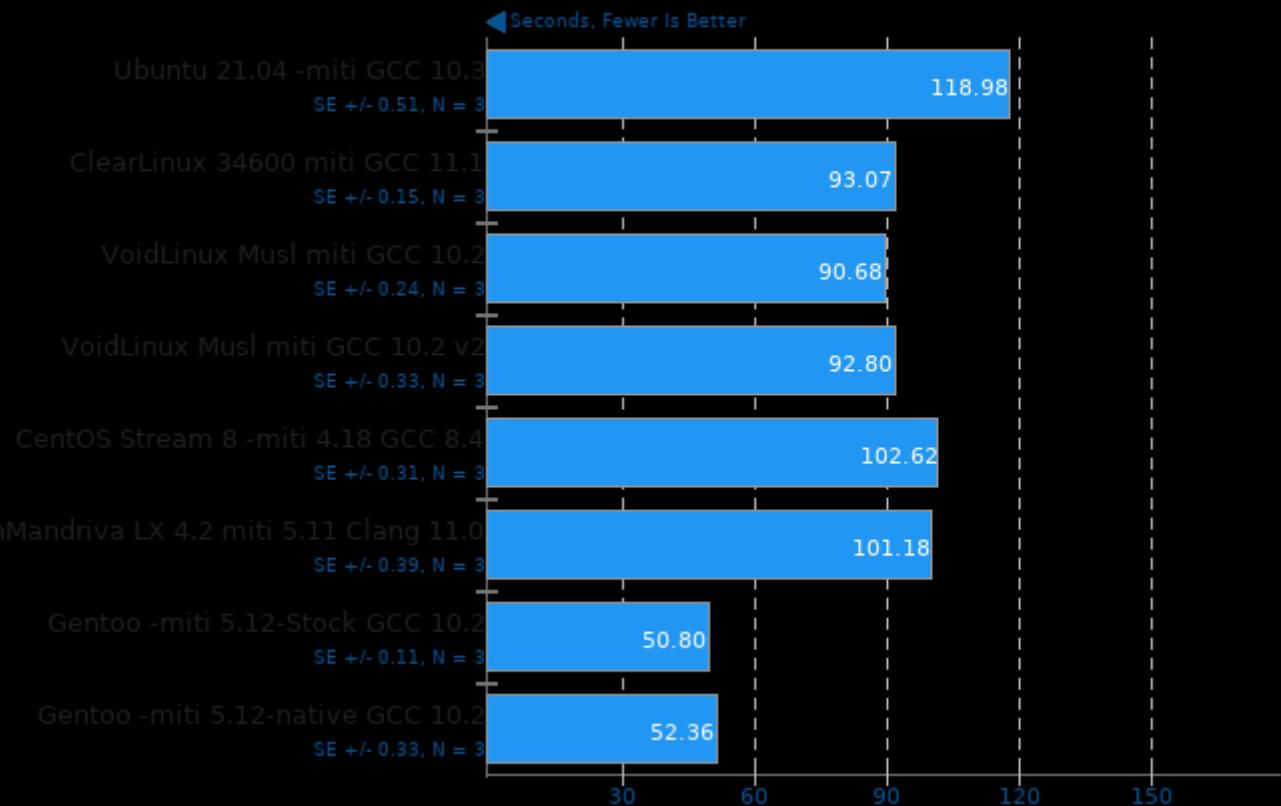
Processor Notes: Scaling Governor: intel\_cpf freq performance - CPU Microcode: 0x21

Security Notes: itlb\_multihit: KVM: Mitigation of VMX disabled + l1tf: Mitigation of PTE Inversion; VMX: vulnerable + mds: Vulnerable; SMT vulnerable + meltdown: Vulnerable + spec\_store\_bypass: Vulnerable + spectre\_v1: Vulnerable: \_\_user pointer sanitization and usercopy barriers only; no swapgs barriers + spectre\_v2: Vulnerable IBPB: disabled STIBP: disabled + srbs: Not affected + tsx\_async\_abort: Not affected

	Ubuntu 21.04	ClearLinu x 34600	VoidLinu x Musl	pluma .phoroni	VoidLinu x Musl	CentOS Stream 8	OpenMan driva LX	Gentoo -miti	Gentoo -miti
<b>Process (sec)</b>									
Normalized	42.69%	54.58%	56.02%		54.74%	49.5%	50.2%	100%	97.02%
Standard Deviation	0.7%	0.3%	0.5%		0.6%	0.5%	0.7%	0.4%	1.1%
<b>BenchmarkMutex - M.L.U.s.m (ns)</b>	<b>40.4</b>					40.1		<b>38.0</b>	40.2
Normalized	94.06%					94.76%		100%	94.53%
Standard Deviation	0.4%					2.5%		0.2%	0.1%
<b>Schbench - 4 - 4 (usec, 99.9th)</b>	<b>40512</b>	38640	40427		38848	<b>50027</b>	<b>38336</b>	40188	40649
<b>Latency Percentile</b>									
Normalized	94.63%	99.21%	94.83%		98.68%	76.63%	100%	95.39%	94.31%
Standard Deviation	1.6%	2.5%	2.4%		1.8%	1.9%	1.2%	2.5%	3.2%
<b>Facebook RocksDB - Rand Read (Op/s)</b>	<b>5618169</b>				5870988	<b>5555113</b>		6155242	<b>6173570</b>
Normalized	91%				95.1%	89.98%		99.7%	100%
Standard Deviation	0.5%				1.6%	0.1%		0.2%	0%
<b>MBW - Memory Copy - 1024 MiB (MiB/s)</b>	<b>7056</b>	6658	<b>6464</b>		6480	6939	6556	7024	6615
Normalized	100%	94.36%	91.6%		91.83%	98.35%	92.92%	99.54%	93.76%
Standard Deviation	0.5%	1.5%	0.6%		0.2%	0.3%	0.2%	0%	3.7%
<b>t-test1 - 2 (sec)</b>	<b>11.986</b>	11.872	11.308		11.508	<b>12.252</b>	<b>5.771</b>	10.049	10.245
Normalized	48.15%	48.61%	51.03%		50.15%	47.1%	100%	57.43%	56.33%
Standard Deviation	0.1%	0.6%	6.2%		5.2%	0%	0.5%	0.1%	0.6%
<b>ctx_clock - C.S.T (Clocks)</b>	<b>1169</b>	1169	1185		1185	<b>1260</b>	1161	<b>204</b>	<b>204</b>
Normalized	17.45%	17.45%	17.22%		17.22%	16.19%	17.57%	100%	100%
Standard Deviation	2%	0.5%	0.2%		0.4%		0.2%		

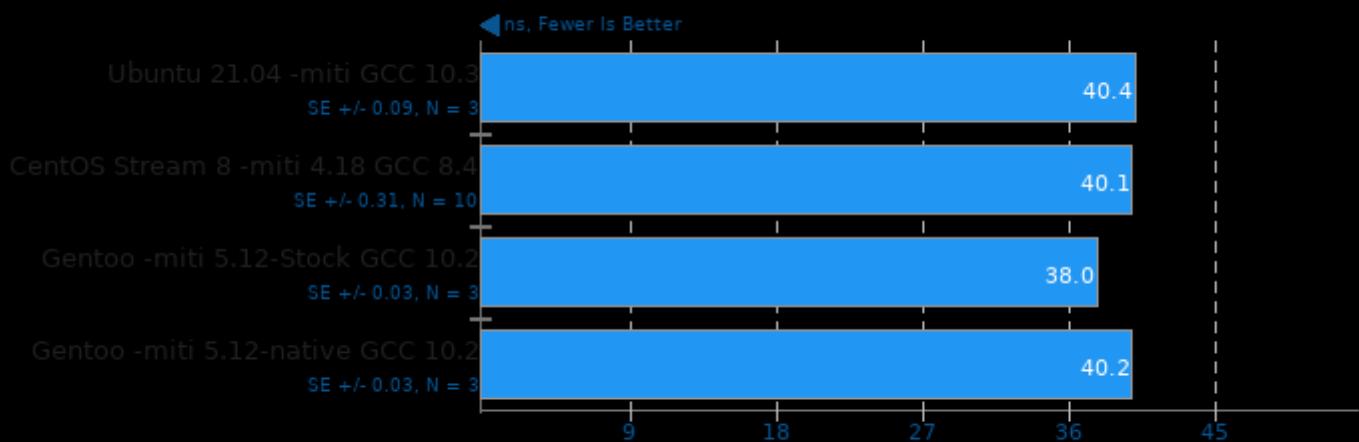
## Hackbench

Count: 4 - Type: Process



## BenchmarkMutex

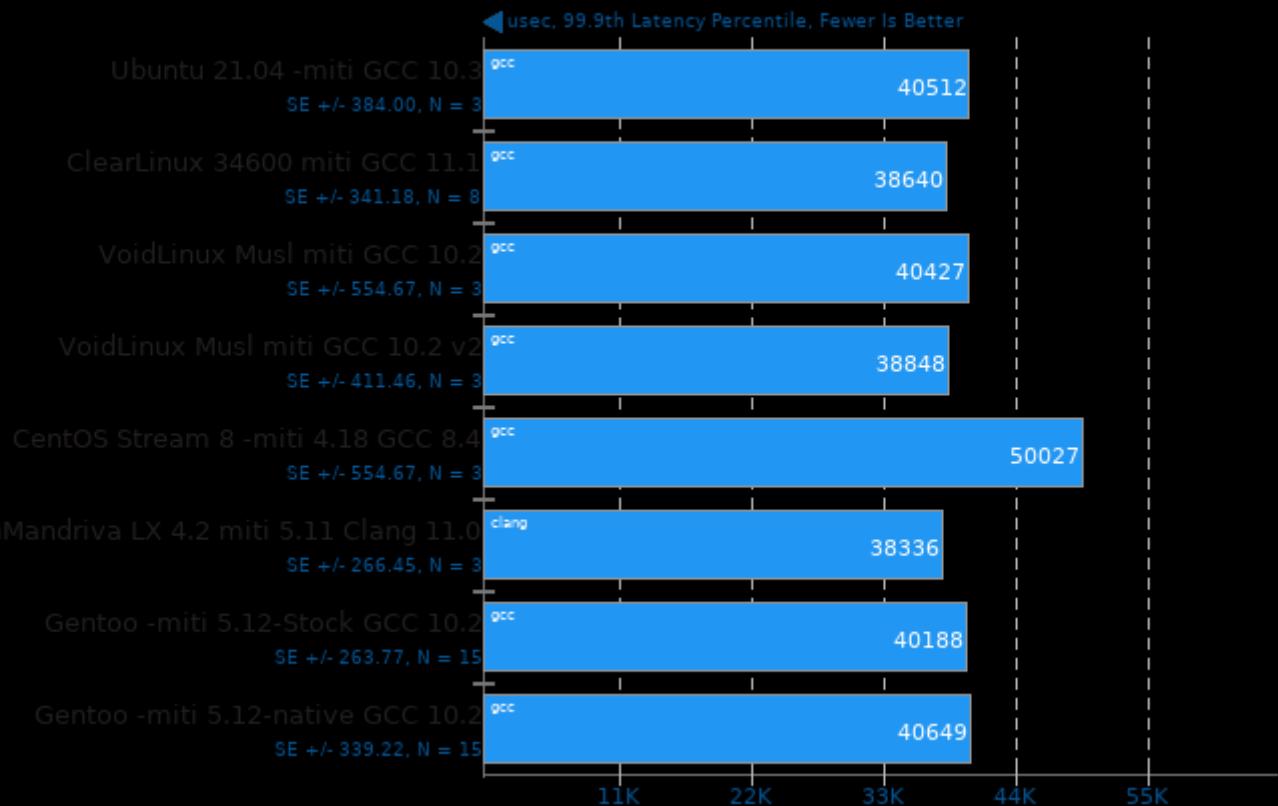
Benchmark: Mutex Lock Unlock std::mutex



1. (CXX) g++ options: -std=c++17 -lbenchmark -pthread

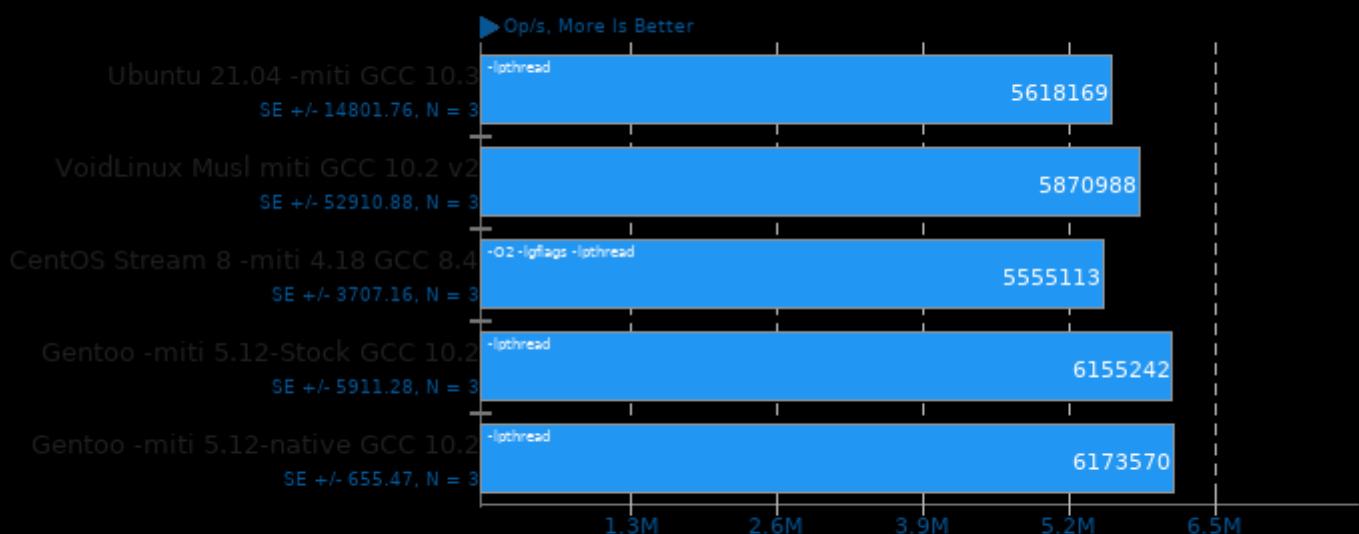
## Schbench

Message Threads: 4 - Workers Per Message Thread: 4



## Facebook RocksDB 6.3.6

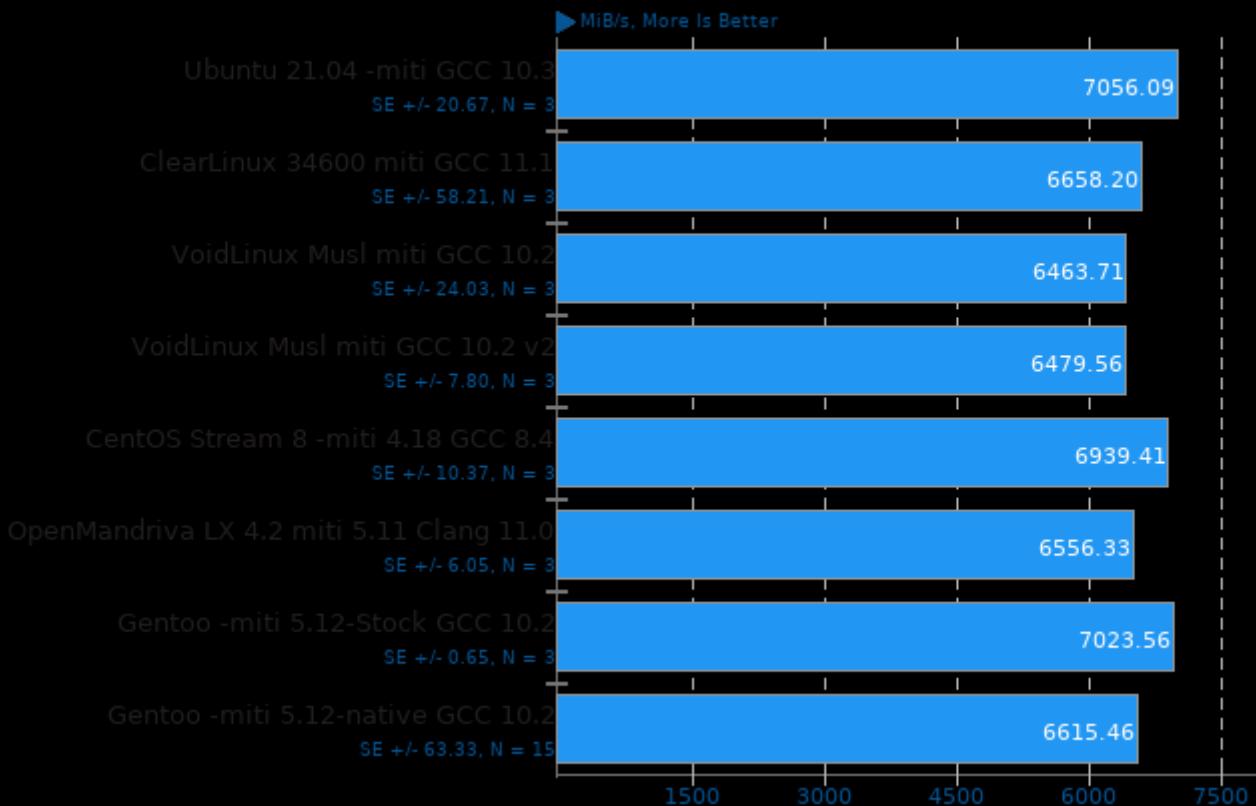
Test: Random Read



1. (CXX) g++ options: -O3 -march=native -std=c++11 -fno-built-in-memcmp -fno-rtti -rdynamic

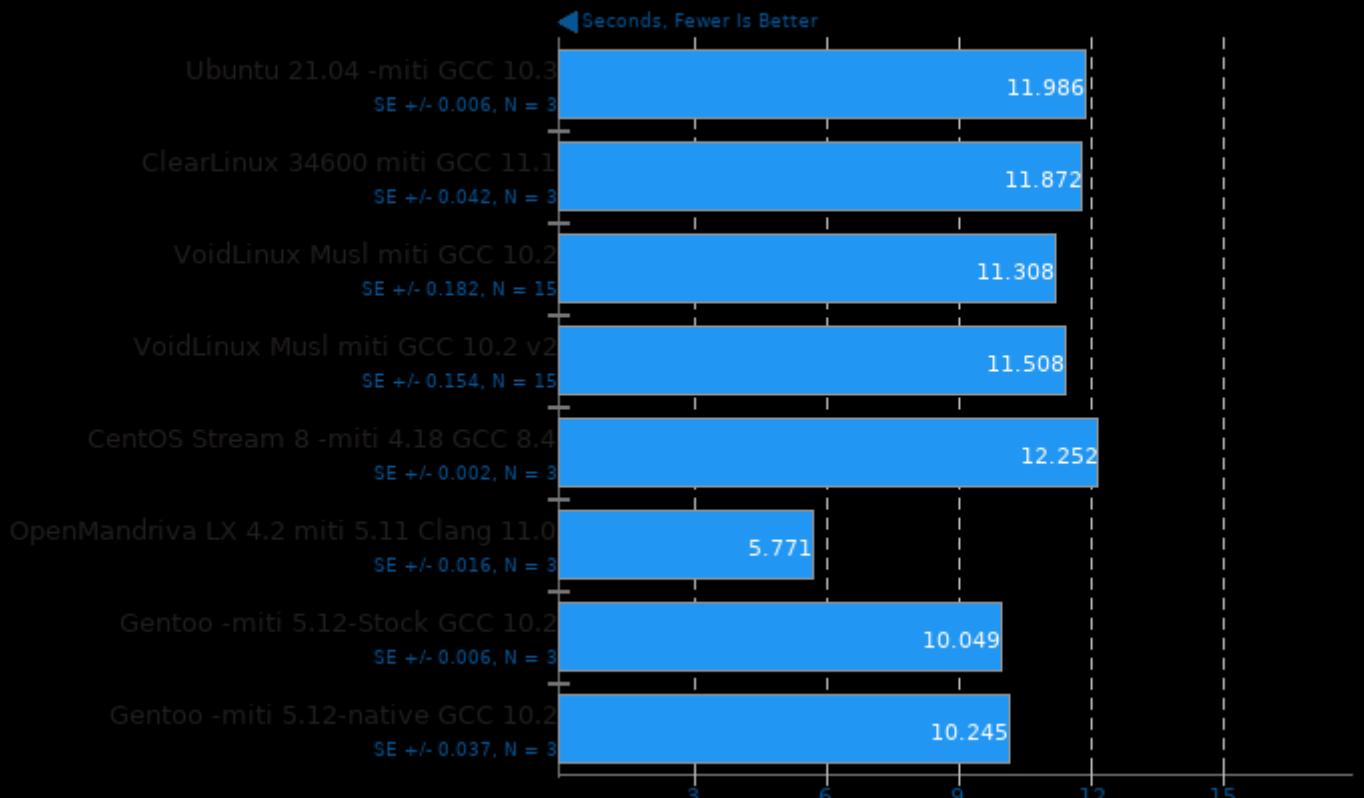
## MBW 2018-09-08

Test: Memory Copy - Array Size: 1024 MiB



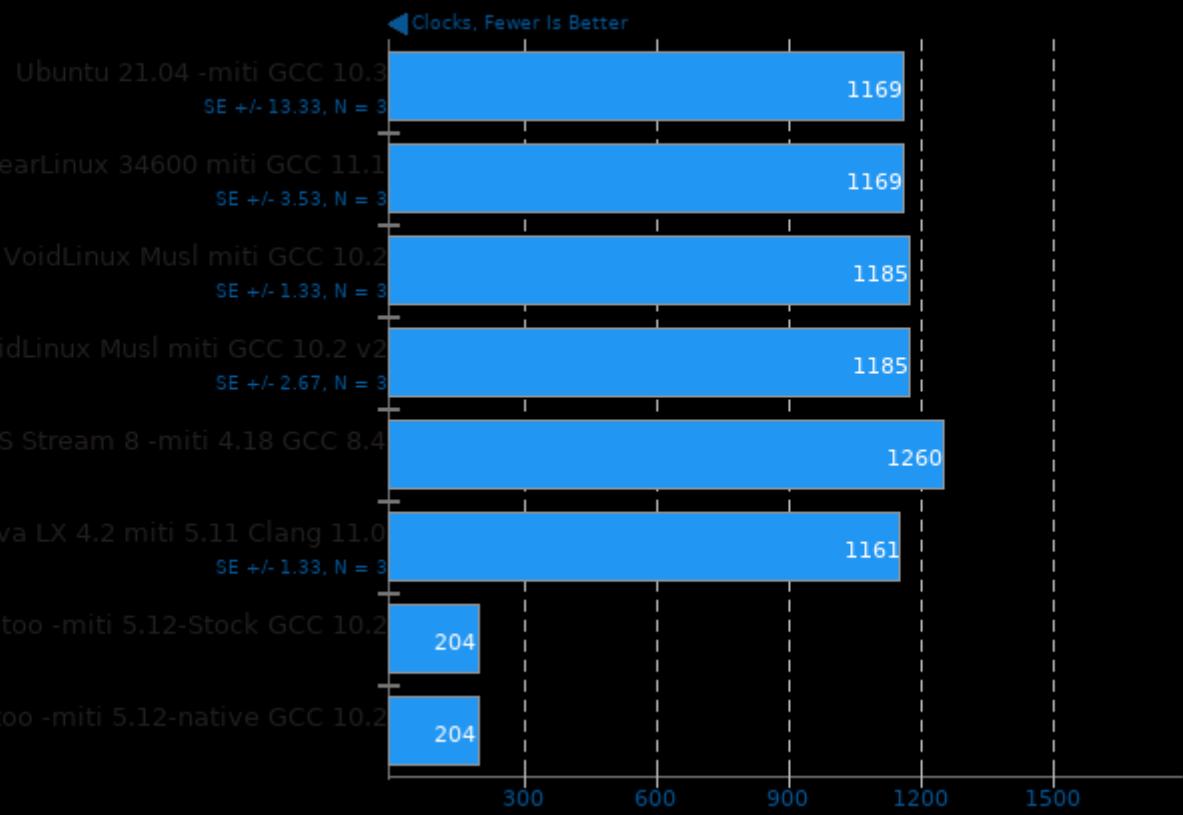
t-test1 2017-01-13

Threads: 2



**ctx\_clock**

Context Switch Time



This file was automatically generated via the Phoronix Test Suite benchmarking software on Thursday, 28 March 2024 12:34.