



## storagetest\_again

balde

### Automated Executive Summary

*blade2 had the most wins, coming in first place for 91% of the tests.*

*Based on the geometric mean of all complete results, the fastest (blade2) was 30.492x the speed of the slowest (nomem raid6). mem raid6 aes-256-CCM was 0.57x the speed of blade2, mem mirror was 0.507x the speed of mem raid6 aes-256-CCM, mem raid6 aes-gcm-256 was 0.983x the speed of mem mirror, susy was 0.51x the speed of mem raid6 aes-gcm-256, mem raid6 was 0.715x the speed of susy, nomem mirror was 0.841x the speed of mem raid6, nomem raid6 was 0.377x the speed of nomem mirror.*

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

*Flexible IO Tester (Type: Random Read - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 142.587x*

*Flexible IO Tester (Type: Random Read - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 139.259x*

*FS-Mark (Test: 5000 Files, 1MB Size, 4 Threads) at 77.208x*

*Flexible IO Tester (Type: Random Read - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: Default Test Directory) at 46.794x*

Flexible IO Tester (Type: Sequential Write - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: Default Test Directory) at 36.57x

Flexible IO Tester (Type: Random Write - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: Default Test Directory) at 35.39x

Flexible IO Tester (Type: Sequential Write - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: Default Test Directory) at 31.132x

SQLite (Threads / Copies: 32) at 29.844x

Flexible IO Tester (Type: Random Write - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: Default Test Directory) at 26.431x

Flexible IO Tester (Type: Random Write - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory) at 23.621x.

## Test Systems:

**nomem raid6**

**mem raid6**

**nomem mirror**

**mem mirror**

**mem raid6 aes-gcm-256**

**mem raid6 aes-256-CCM**

Processor: Intel Core i7-3770 @ 3.90GHz (4 Cores / 8 Threads), Motherboard: ASUS P8H77-M PRO (9012 BIOS), Chipset: Intel Xeon E3-1200 v2/3rd, Memory: 32GB, Disk: 7 x 4001GB HGST HMS5C4040BL + 256GB Generic, Graphics: ASUS Intel Xeon E3-1200 v2/3rd Gen Core (1150MHz), Network: Realtek RTL8111/8168/8411

OS: Debian 11, Kernel: 5.10.120+truenas (x86\_64), Vulkan: 1.0.2, Compiler: GCC 10.2.1 20210110, File-System: zfs, Screen Resolution: 1024x768

Kernel Notes: libata.allow\_tpm=1 - Transparent Huge Pages: always

Compiler Notes: --build=x86\_64-linux-gnu --disable-vtable-verify --enable-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-Km9U7s/gcc-10-10.2.1/debian/tmp-nvptx/usr,amdgn-amdhsa=/build/gcc-10-Km9U7s/gcc-10-10.2.1/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\_cpufreq schedutil - CPU Microcode: 0x21

Disk Scheduler Notes: MQ-DEADLINE

Python Notes: Python 3.9.2

Security Notes: itlb\_multihit: KVM: Mitigation of VMX disabled + 11tf: 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 Retpolines IBPB: conditional IBRS\_FW STIBP: conditional RSB filling + srbds: Vulnerable: No microcode + tsx\_async\_abort: Not affected

**susy**

Processor: AMD FX-4170 @ 4.20GHz (2 Cores / 4 Threads), Motherboard: Gigabyte GA-990FXA-D3 (F3 BIOS), Chipset: AMD RD9x0/RX980, Memory: 16GB, Disk: 5 x 6001GB Western Digital WD60EFZX-68B + 120GB Corsair Force GT + 6001GB HDWN160, Graphics: Gigabyte NVIDIA GeForce GTX 1050 Ti 4GB, Audio: Realtek ALC889, Network: Realtek RTL8111/8168/8411

OS: Debian 11, Kernel: 5.10.120+truenas (x86\_64), Display Driver: NVIDIA, Vulkan: 1.0.2, Compiler: GCC 10.2.1 20210110, File-System: zfs, Screen Resolution: 800x600

Kernel Notes: libata.allow\_tpm=1 kvm\_amd.npt=1 kvm\_amd.avic=1 - Transparent Huge Pages: always  
 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-Km9U7s/gcc-10-10.2.1/debian/tmp-nvptx/usr,amdgc-nv-none=/build/gcc-10-Km9U7s/gcc-10-10.2.1/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: acpi-cpufreq schedutil (Boost: Enabled) - CPU Microcode: 0x6000063e  
 Disk Scheduler Notes: MQ-DEADLINE  
 Python Notes: Python 3.9.2  
 Security Notes: itlb\_multihit: Not affected + 11tf: Not affected + mds: Not affected + meltdown: Not affected + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Mitigation of Retpolines IBPB: conditional STIBP: disabled RSB filling + srbds: Not affected + tsx\_async\_abort: Not affected

## blade

## blade2

Processor: Intel Core i7-10875H @ 5.10GHz (8 Cores / 16 Threads), Motherboard: Razer DA760 v4 (1.03 BIOS), Chipset: Intel Comet Lake PCH, Memory: 32GB, Disk: 1024GB SAMSUNG MZVLB1T0HBLR-00A00 + 1024GB INTEL SSDPEKNW010T8, Graphics: NVIDIA GeForce RTX 3080 Laptop GPU 8GB, Audio: Realtek ALC298, Network: Realtek RTL8125 2.5GbE + Intel Wi-Fi 6 AX210/AX211/AX411

OS: ManjaroLinux 21.3.6, Kernel: 5.15.59-1-MANJARO (x86\_64), Desktop: Xfce 4.16, Display Server: X Server 1.21.1.4, Display Driver: NVIDIA 515.65.01, OpenGL: 4.6.0 NVIDIA 515.65.01, Compiler: GCC 12.1.1 20220730 + Clang 14.0.6 + LLVM 14.0.6 + CUDA 11.7, File-System: zfs, Screen Resolution: 5120x3240

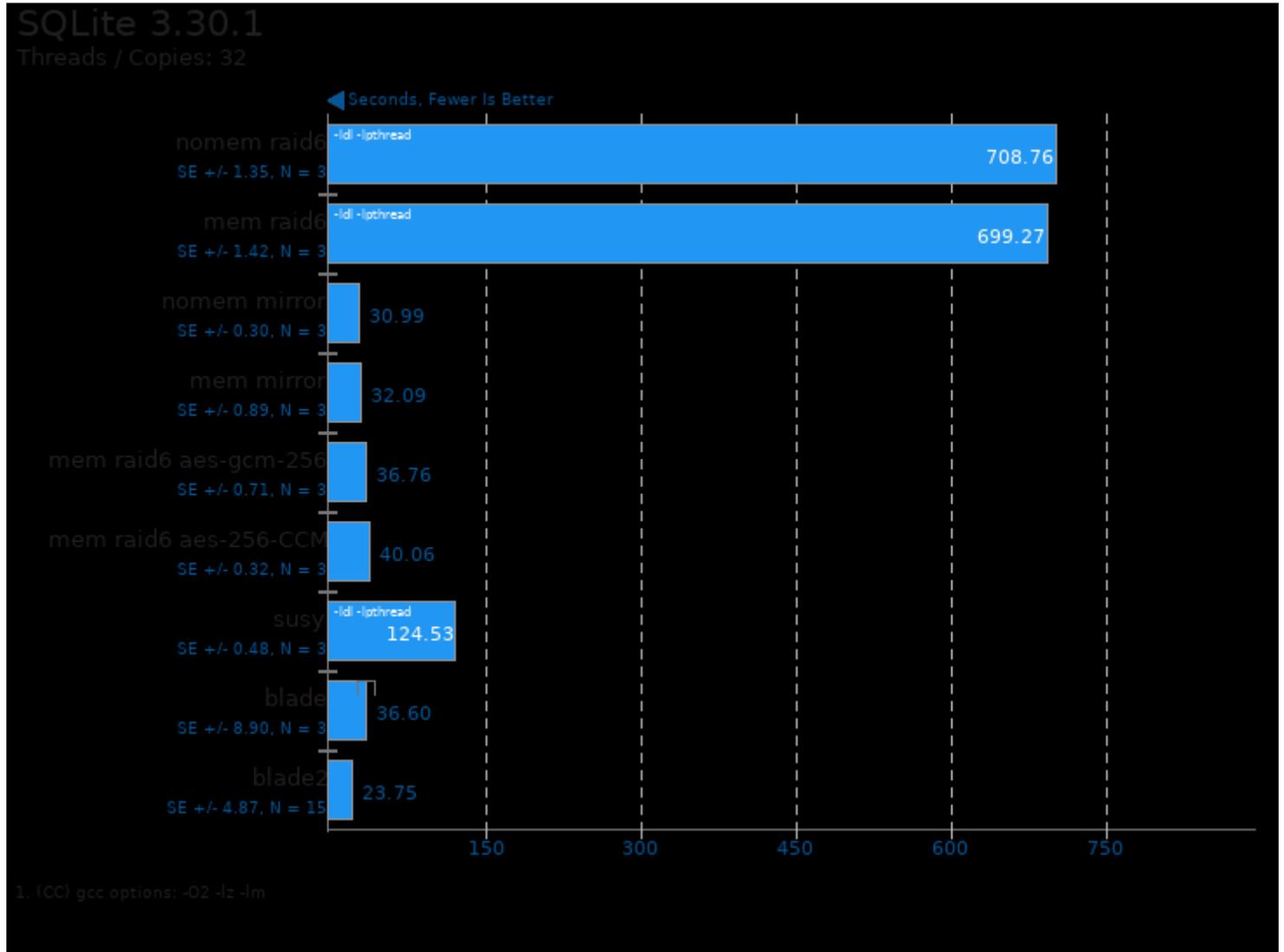
Kernel Notes: Transparent Huge Pages: madvise  
 Compiler Notes: --disable-libssp --disable-libstdcxx-pch --disable-werror --enable-\_\_cxa\_atexit --enable-bootstrap --enable-cet=auto --enable-checking=release --enable-clocale=gnu --enable-default-pie --enable-default-ssp --enable-gnu-indirect-function --enable-gnu-unique-object --enable-languages=c,c++,ada,fortran,go,lto,objc,obj-c++,d --enable-libstdcxx-backtrace --enable-link-serialization=1 --enable-lto --enable-multilib --enable-plugin --enable-shared --enable-threads=posix --mandir=/usr/share/man --with-build-config=bootstrap-lto --with-linker-hash-style=gnu  
 Disk Notes: NONE / noatime,rw / Block Size: 131072  
 Processor Notes: Scaling Governor: intel\_pstate powersave (EPP: balance\_performance) - CPU Microcode: 0xf0  
 Python Notes: Python 3.10.5  
 Security Notes: itlb\_multihit: KVM: Mitigation of VMX disabled + 11tf: Not affected + mds: Not affected + meltdown: Not affected + mmio\_stale\_data: Mitigation of Clear buffers; SMT vulnerable + retbleed: Mitigation of Enhanced IBRS + spec\_store\_bypass: Mitigation of SSB disabled via prctl and seccomp + spectre\_v1: Mitigation of usercopy/swaps barriers and \_\_user pointer sanitization + spectre\_v2: Vulnerable: eIBRS with unprivileged eBPF + srbds: Mitigation of Microcode + tsx\_async\_abort: Not affected

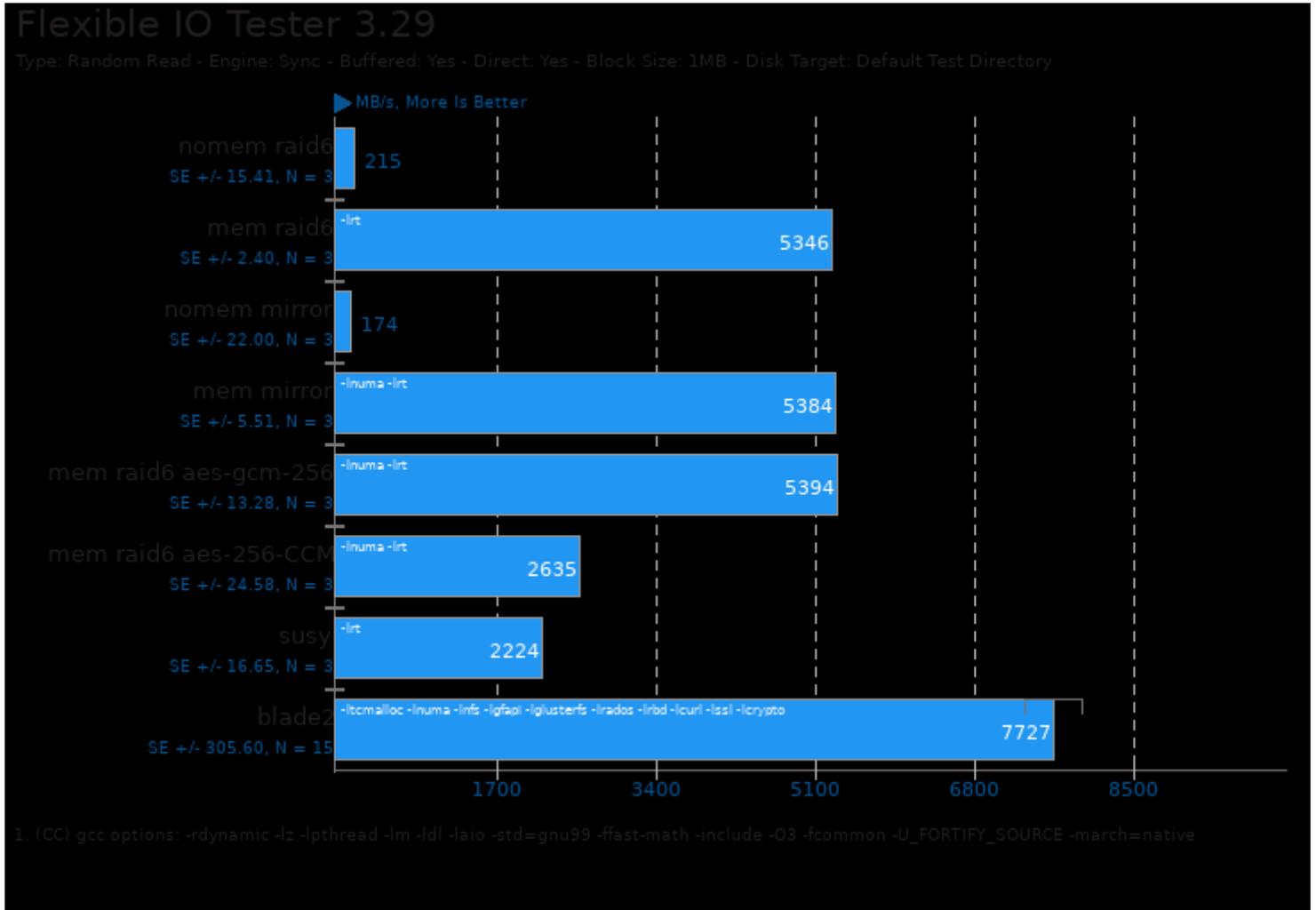
	nomem raid6	mem raid6	nomem mirror	mem mirror	mem raid6	mem raid6	susy	blade	blade2
					aes-gcm-	aes-256-C			
<b>SQLite - 32 (sec)</b>	<b>708.762</b>	699.270	30.993	32.093	36.762	40.064	124.531	36.602	<b>23.749</b>
<b>Normalized</b>	3.35%	3.4%	76.63%	74%	64.6%	59.28%	19.07%	64.88%	100%
<b>Standard Deviation</b>	0.3%	0.4%	1.7%	4.8%	3.4%	1.4%	0.7%	42.1%	79.5%

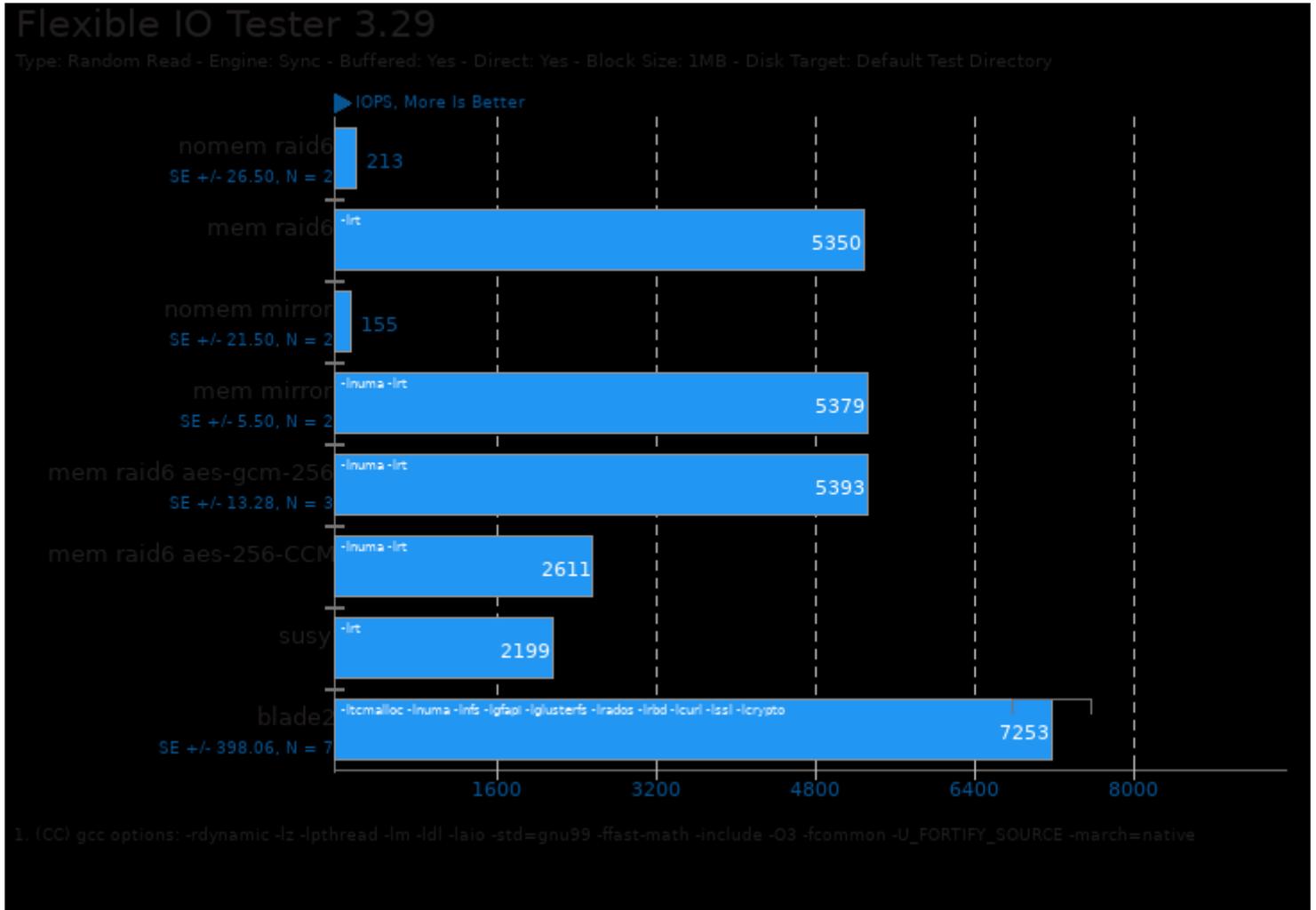
Flexible IO Tester -	215	5346	174	5384	5394	2595	2224	7727
Rand Read - Sync -								
Yes - Yes - 1MB								
(MB/s)								
Normalized	2.78%	69.19%	2.25%	69.68%	69.81%	33.58%	28.78%	100%
Standard Deviation	12.4%	0.1%	21.9%	0.2%	0.4%	1.2%	1.3%	15.3%
Flexible IO Tester -	213	5350	155	5379	5393	2611	2199	7253
Rand Read - Sync -								
Yes - Yes - 1MB								
(IOPS)								
Normalized	2.94%	73.76%	2.14%	74.16%	74.36%	36%	30.32%	100%
Standard Deviation	17.6%		19.7%	0.1%	0.4%			14.5%
Flexible IO Tester -	3.454	201	5.456	197	205	105	116	481
Rand Read - Sync -								
Yes - Yes - 4KB								
(MB/s)								
Normalized	0.72%	41.79%	1.13%	40.96%	42.62%	21.83%	24.12%	100%
Standard Deviation	0.5%	0.3%	1.6%			1%	0.5%	45.9%
Flexible IO Tester -	863	51667	1364	50433	52367	26867	29767	123053
Rand Read - Sync -								
Yes - Yes - 4KB								
(IOPS)								
Normalized	0.7%	41.99%	1.11%	40.98%	42.56%	21.83%	24.19%	100%
Standard Deviation	0.5%	0.2%	1.6%	0.2%	0.9%	1.1%	0.5%	45.9%
Flexible IO Tester -	306	382	309	378	411	7509	447	8088
Rand Write - Sync -								
Yes - Yes - 1MB								
(MB/s)								
Normalized	3.78%	4.72%	3.82%	4.67%	5.08%	92.84%	5.53%	100%
Standard Deviation	5.2%	1.4%	6%	0.3%	2.6%	4.3%	1.4%	16.8%
Flexible IO Tester -	300	384	308	377	411	7144	443	10617
Rand Write - Sync -								
Yes - Yes - 1MB								
(IOPS)								
Normalized	2.83%	3.62%	2.9%	3.55%	3.87%	67.29%	4.17%	100%
Standard Deviation	5.9%	0.9%	6%	0.3%	0.5%			16.6%
Flexible IO Tester -	40.6	358	52.1	265	309	52.6	56.6	959
Rand Write - Sync -								
Yes - Yes - 4KB								
(MB/s)								
Normalized	4.23%	37.33%	5.43%	27.63%	32.22%	5.48%	5.9%	100%
Standard Deviation	5.6%	6%	1.1%	2.9%	3.9%	0.7%	0.5%	19%
Flexible IO Tester -	10405	91500	13333	67900	79000	13467	14500	245500
Rand Write - Sync -								
Yes - Yes - 4KB								
(IOPS)								
Normalized	4.24%	37.27%	5.43%	27.66%	32.18%	5.49%	5.91%	100%
Standard Deviation	5.8%	6.1%	0.9%	2.8%	3.9%	0.9%	0.7%	19%

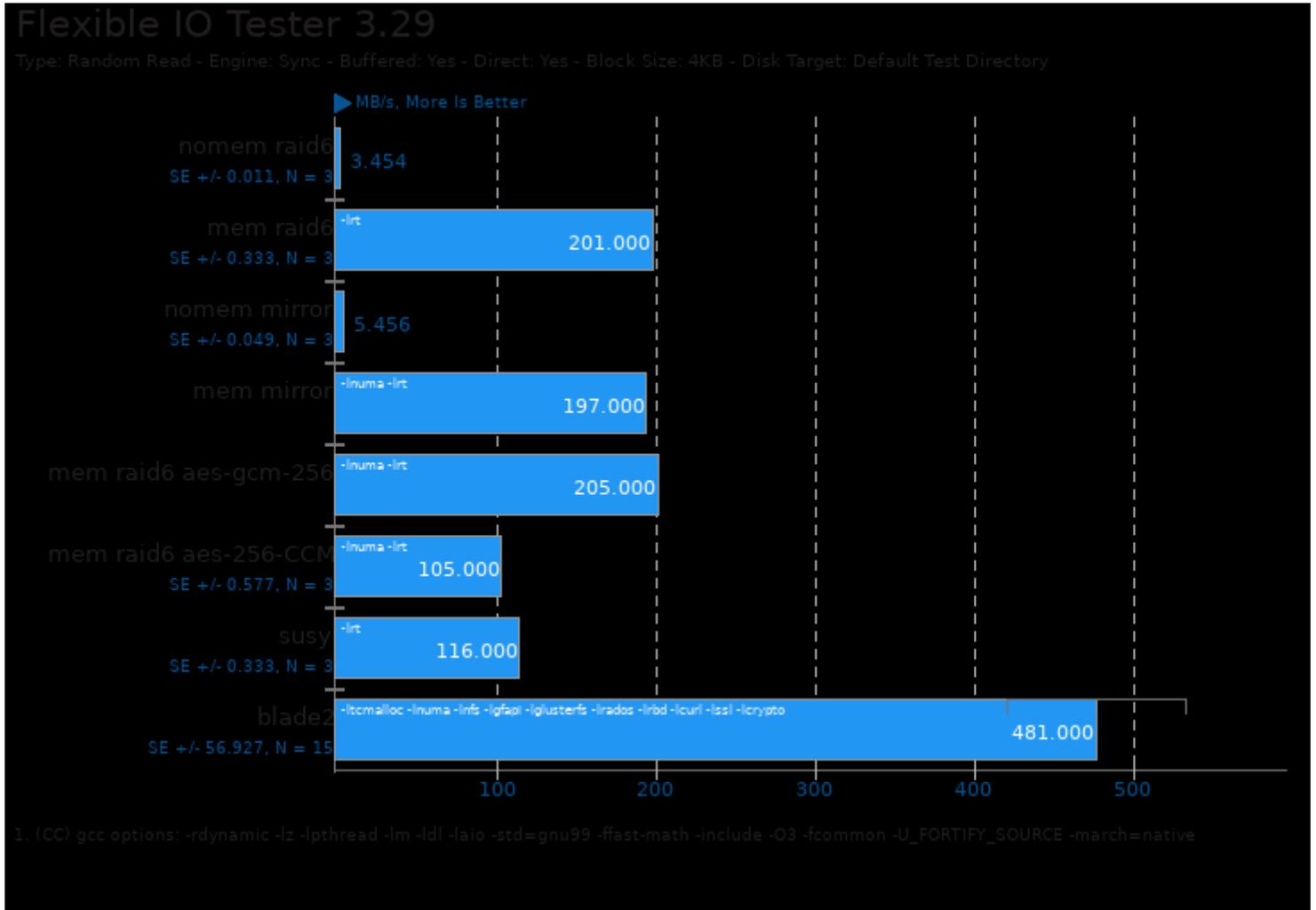
<b>Flexible IO Tester - Seq Read - Sync - Yes - Yes - 1MB (MB/s)</b>	<b>462</b>	5403	561	5435	5445	2623	2235	<b>6587</b>
Normalized	7.01%	82.03%	8.52%	82.51%	82.66%	39.82%	33.93%	100%
Standard Deviation	0.9%	0.3%	7.1%	0.2%	0.2%	0.4%	0.2%	1.8%
<b>Flexible IO Tester - Seq Read - Sync - Yes - Yes - 1MB (IOPS)</b>	<b>460</b>	5408	581	5434	5429	2630	2234	<b>6586</b>
Normalized	6.98%	82.11%	8.82%	82.51%	82.43%	39.93%	33.92%	100%
Standard Deviation	1.2%		3.7%	0.2%			0.2%	1.8%
<b>Flexible IO Tester - Seq Read - Sync - Yes - Yes - 4KB (MB/s)</b>	<b>443</b>	1292	536	1299	1278	622	684	<b>2236</b>
Normalized	19.81%	57.78%	23.97%	58.09%	57.16%	27.82%	30.59%	100%
Standard Deviation	9.4%	2.6%	1.7%	1.9%	0.9%	1.4%	0.8%	1.5%
<b>Flexible IO Tester - Seq Read - Sync - Yes - Yes - 4KB (IOPS)</b>	<b>113333</b>	330667	137333	332667	327000	159333	175000	<b>572333</b>
Normalized	19.8%	57.78%	24%	58.12%	57.13%	27.84%	30.58%	100%
Standard Deviation	9.7%	2.7%	1.7%	1.9%		1.6%	1%	1.5%
<b>Flexible IO Tester - Seq Write - Sync - Yes - Yes - 1MB (MB/s)</b>	<b>304</b>	361	308	339	370	7582	381	<b>9464</b>
Normalized	3.21%	3.81%	3.25%	3.58%	3.91%	80.11%	4.03%	100%
Standard Deviation	5.8%	5.4%	0.7%		1.5%	2.3%	0.9%	
<b>Flexible IO Tester - Seq Write - Sync - Yes - Yes - 1MB (IOPS)</b>	<b>302</b>	349	308	338	372	7581	381	<b>11044</b>
Normalized	2.73%	3.16%	2.79%	3.06%	3.37%	68.64%	3.45%	100%
Standard Deviation	8.2%	1%	0.7%		1.1%	2.3%	1.1%	7.5%
<b>Flexible IO Tester - Seq Write - Sync - Yes - Yes - 4KB (MB/s)</b>	408	628	509	691	663	393	<b>337</b>	<b>1376</b>
Normalized	29.65%	45.64%	36.99%	50.22%	48.18%	28.56%	24.49%	100%
Standard Deviation	4.9%	1.1%	4.2%	2.8%	5.3%	1.6%	1.1%	1.4%
<b>Flexible IO Tester - Seq Write - Sync - Yes - Yes - 4KB (IOPS)</b>	104167	161000	130333	176667	169667	100467	<b>86333</b>	<b>352333</b>
Normalized	29.56%	45.7%	36.99%	50.14%	48.16%	28.51%	24.5%	100%
Standard Deviation	4.8%		4.4%	2.8%	5.3%	1.4%	1.1%	1.4%
<b>FS-Mark - 5.F.1.S.4.T (Files/s)</b>	83.3	<b>79.4</b>	1763	4234	4329	4518	1573	<b>6130</b>
Normalized	1.36%	1.3%	28.77%	69.07%	70.61%	73.69%	25.67%	100%

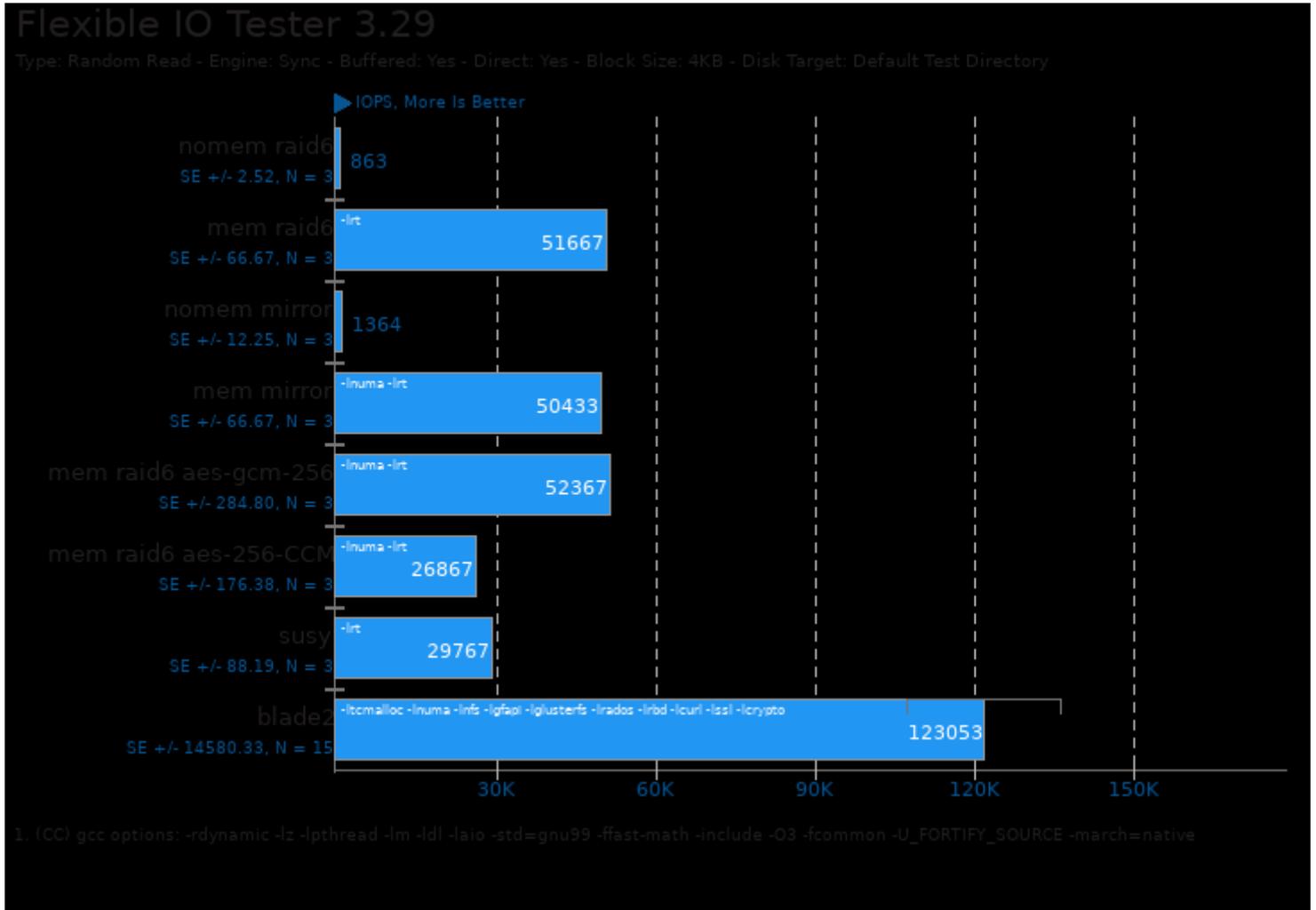
<b>Standard Deviation</b>	1.4%	1.2%	1.3%	1.7%	0.5%	0.7%	8.8%	10.7%
<b>Dbench - 12 (MB/s)</b>	139.855	<b>138.815</b>	1100	1084	855.983	857.599	288.23	<b>1759</b>
<b>Normalized</b>	7.95%	7.89%	62.52%	61.64%	48.65%	48.75%	16.38%	100%
<b>Standard Deviation</b>	2%	2.4%	2.4%	3.6%	1.7%	1.7%	1.4%	10.4%
<b>Compile Bench -</b>	529.38	1466	<b>508.91</b>	<b>1698</b>	1207	932.38	729.76	952.92
<b>Compile (MB/s)</b>								
<b>Normalized</b>	31.17%	86.33%	29.97%	100%	71.06%	54.9%	42.97%	56.11%
<b>Standard Deviation</b>	12.1%	3.4%	4.4%	0.7%	8.7%	13.5%	3.8%	48%
<b>Compile Bench -</b>	151.06	185.88	171.46	198.26	178.35	175.24	<b>106.79</b>	<b>257.20</b>
<b>Initial Create (MB/s)</b>								
<b>Normalized</b>	58.73%	72.27%	66.66%	77.08%	69.34%	68.13%	41.52%	100%
<b>Standard Deviation</b>	3.3%	0.4%	1.9%	1.7%	1.4%	1.3%	0.3%	14.4%
<b>Compile Bench -</b>	671.46	980.65	<b>471.94</b>	1016	891.12	616.12	621.22	<b>1477</b>
<b>Read Compiled Tree</b>								
<b>Normalized</b>	45.45%	66.38%	31.95%	68.79%	60.32%	41.71%	42.05%	100%
<b>Standard Deviation</b>	4.7%	1.4%	4.2%	1.8%	0.5%	1.2%	11.1%	3.6%
<b>PostMark - D.T.P</b>	2650	2762	2492	2841	<b>2852</b>	2443	1304	<b>800</b>
<b>(TPS)</b>								
<b>Normalized</b>	92.92%	96.84%	87.38%	99.61%	100%	85.66%	45.72%	28.05%
<b>Standard Deviation</b>	7.3%	5.5%	2.1%	2.3%	2.3%	2.1%	1.1%	29.9%





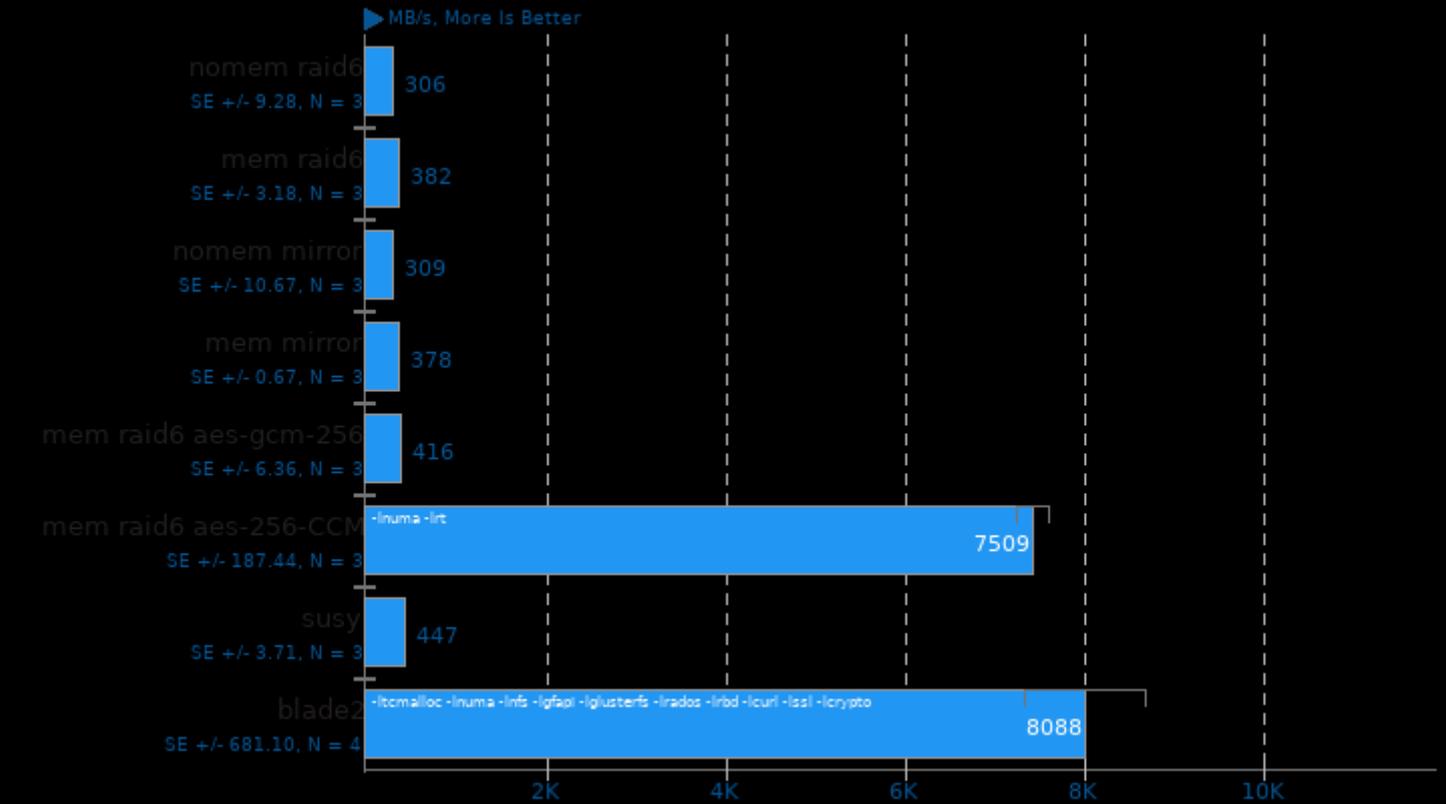




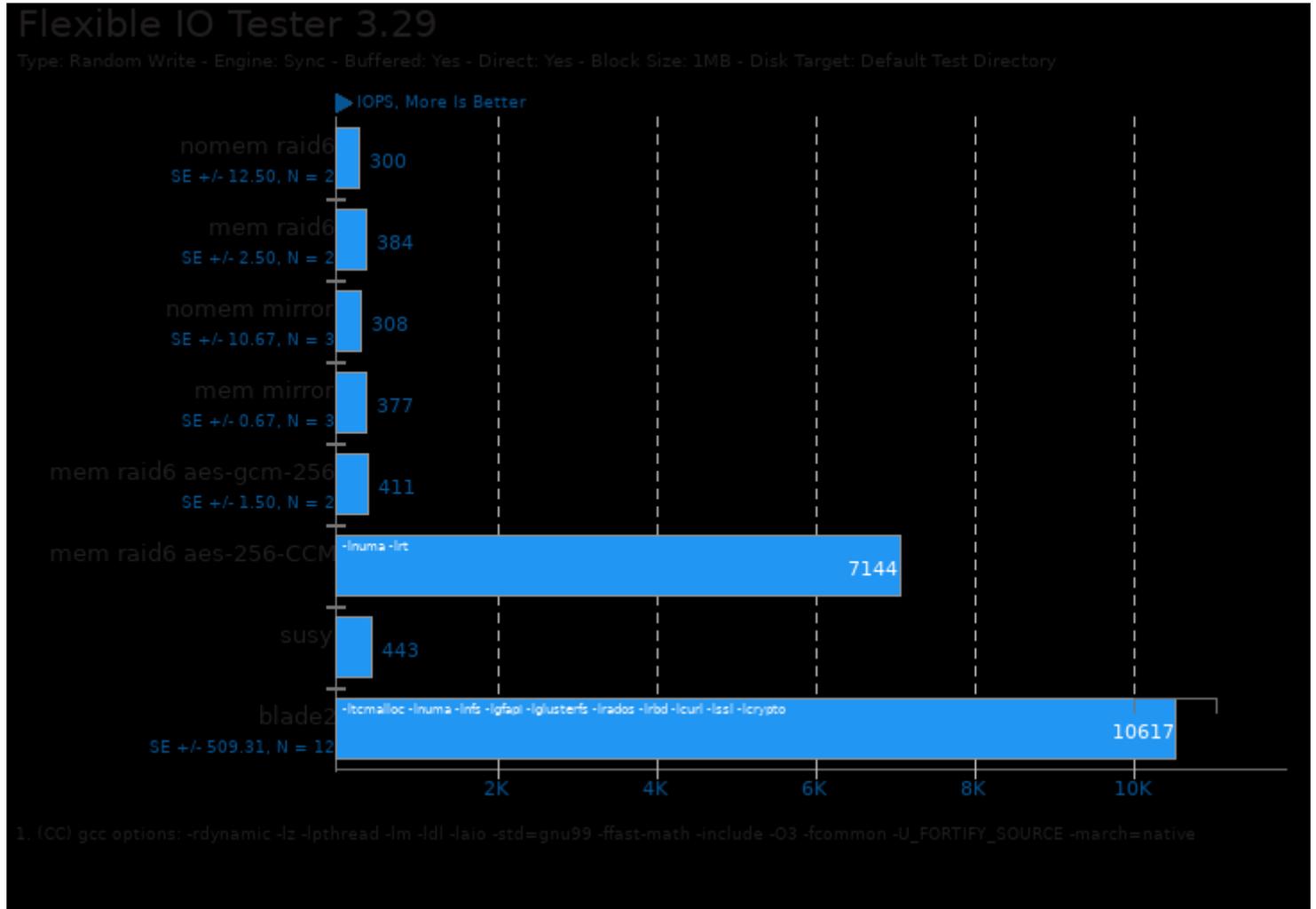


# Flexible IO Tester 3.29

Type: Random Write - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: Default Test Directory

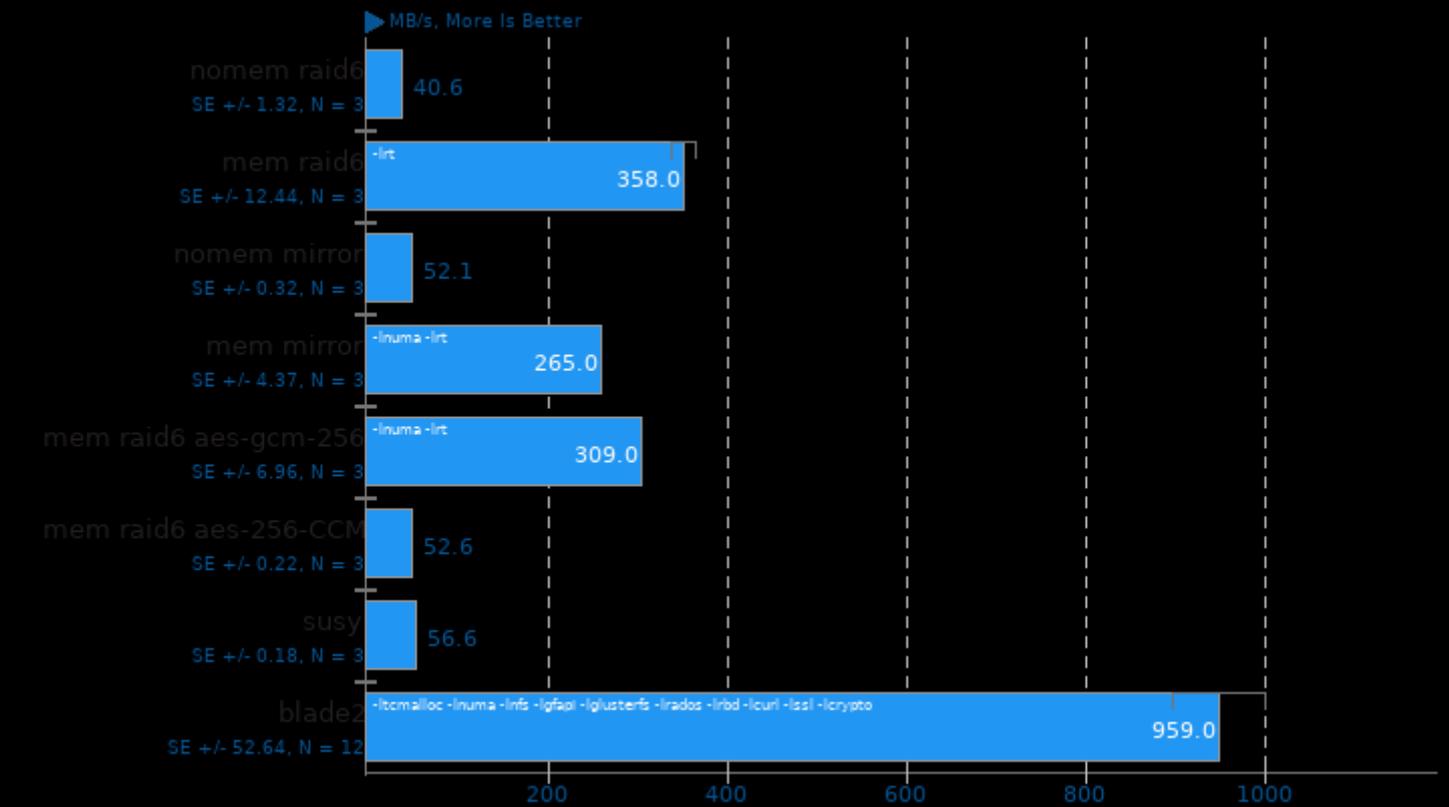


1. (CC) gcc options: -rdynamic -lz -pthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U\_FORTIFY\_SOURCE -march=native

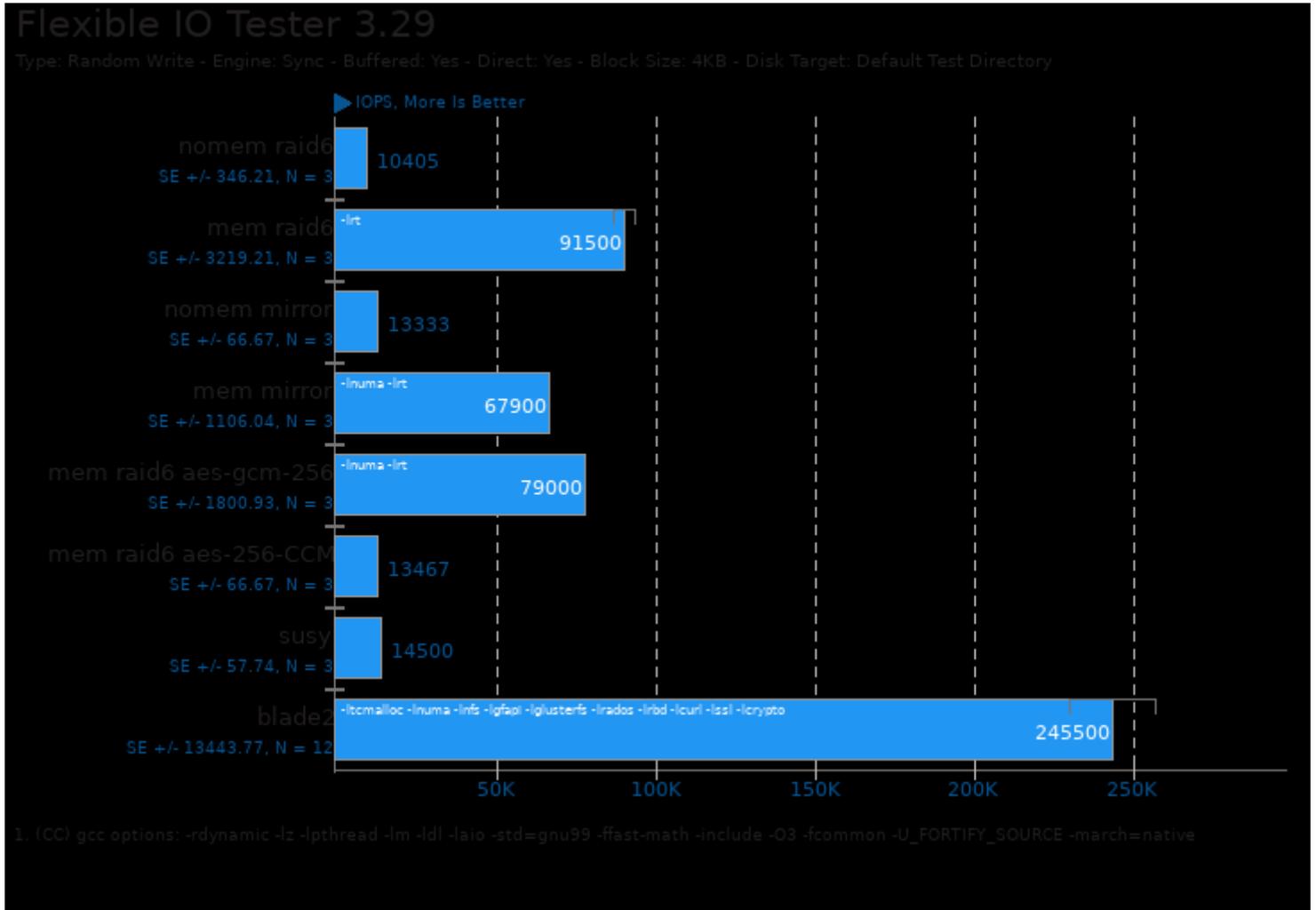


# Flexible IO Tester 3.29

Type: Random Write - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory

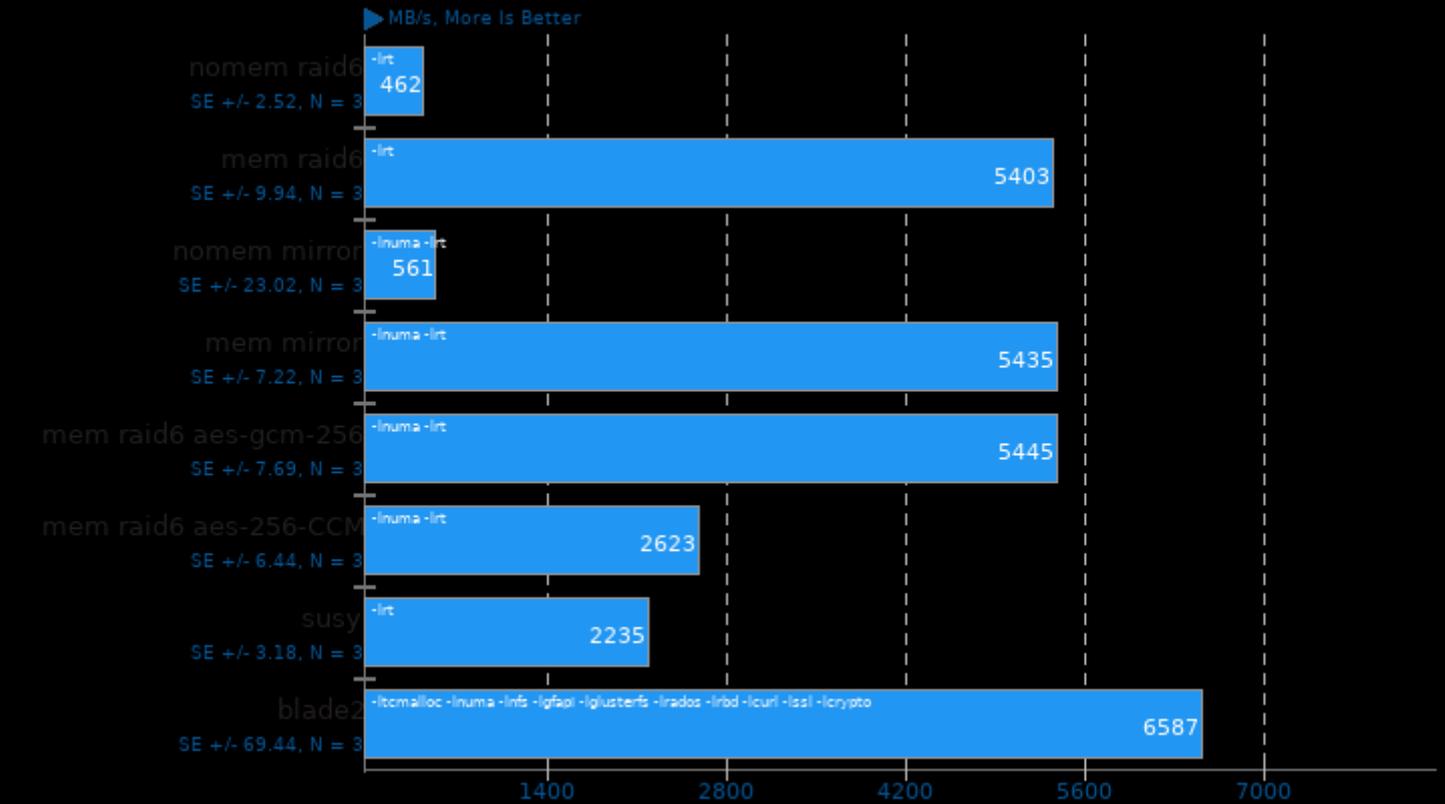


1. (GCC) gcc options: -rdynamic -lz -pthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U\_FORTIFY\_SOURCE -march=native

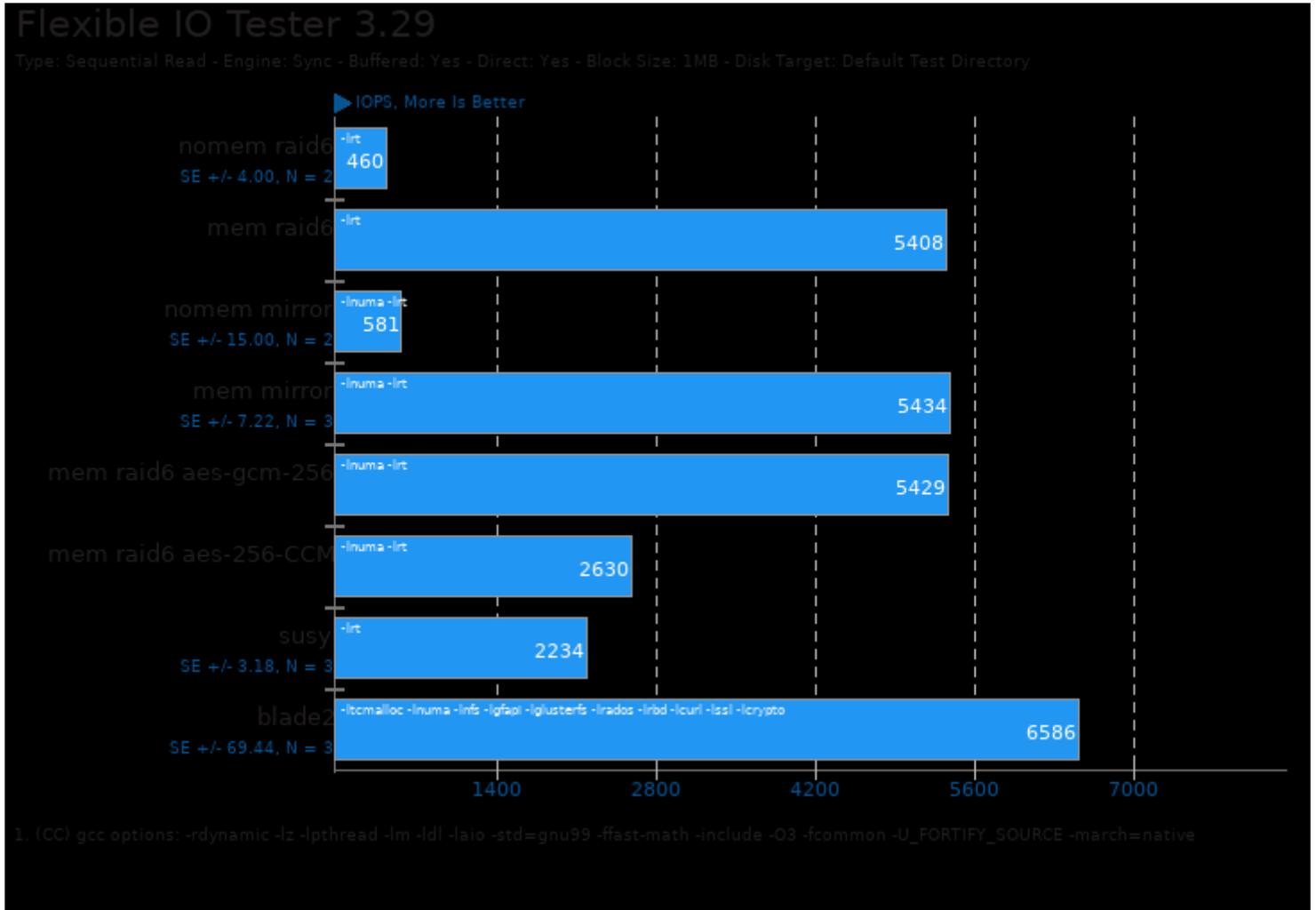


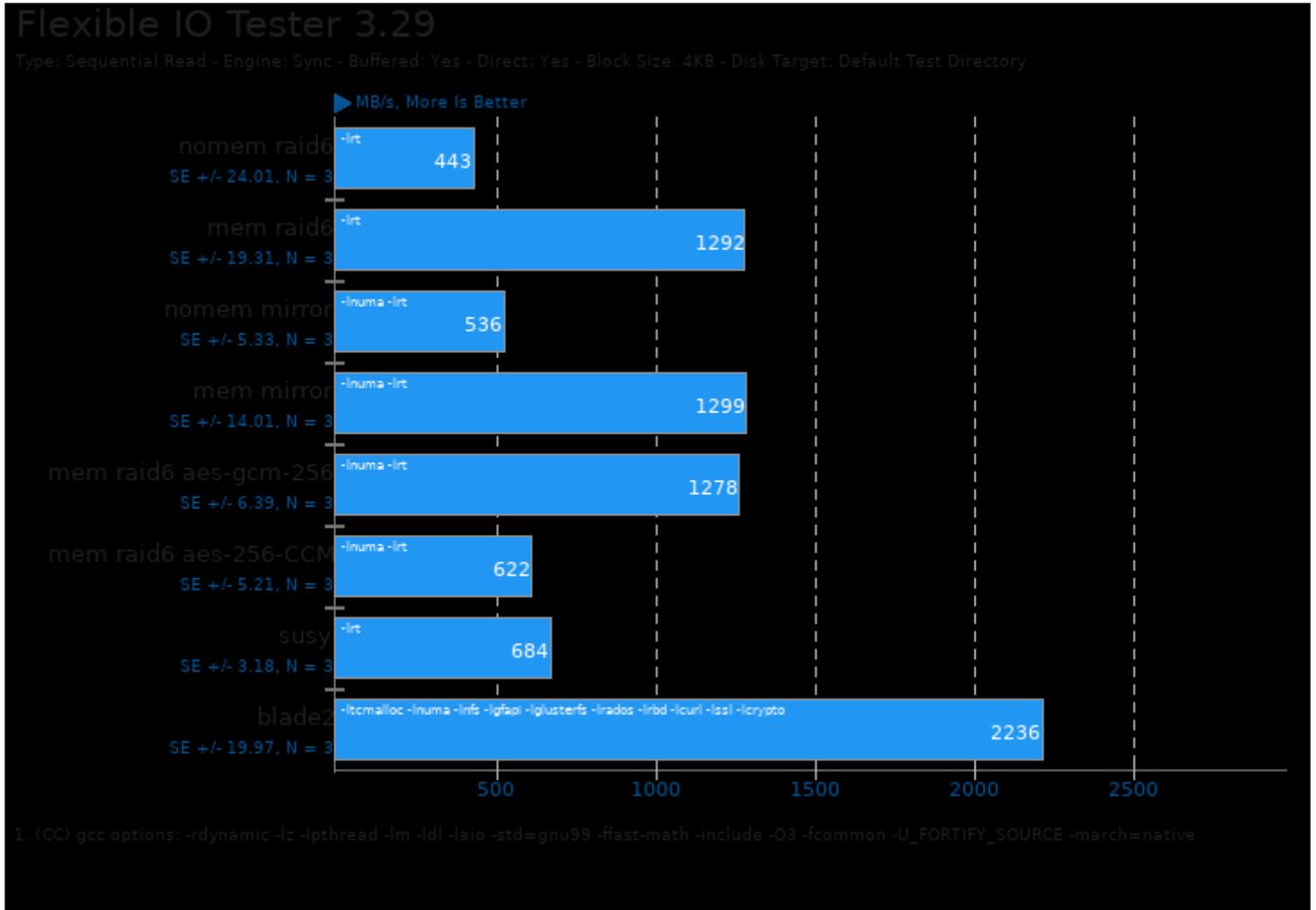
# Flexible IO Tester 3.29

Type: Sequential Read - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 1MB - Disk Target: Default Test Directory



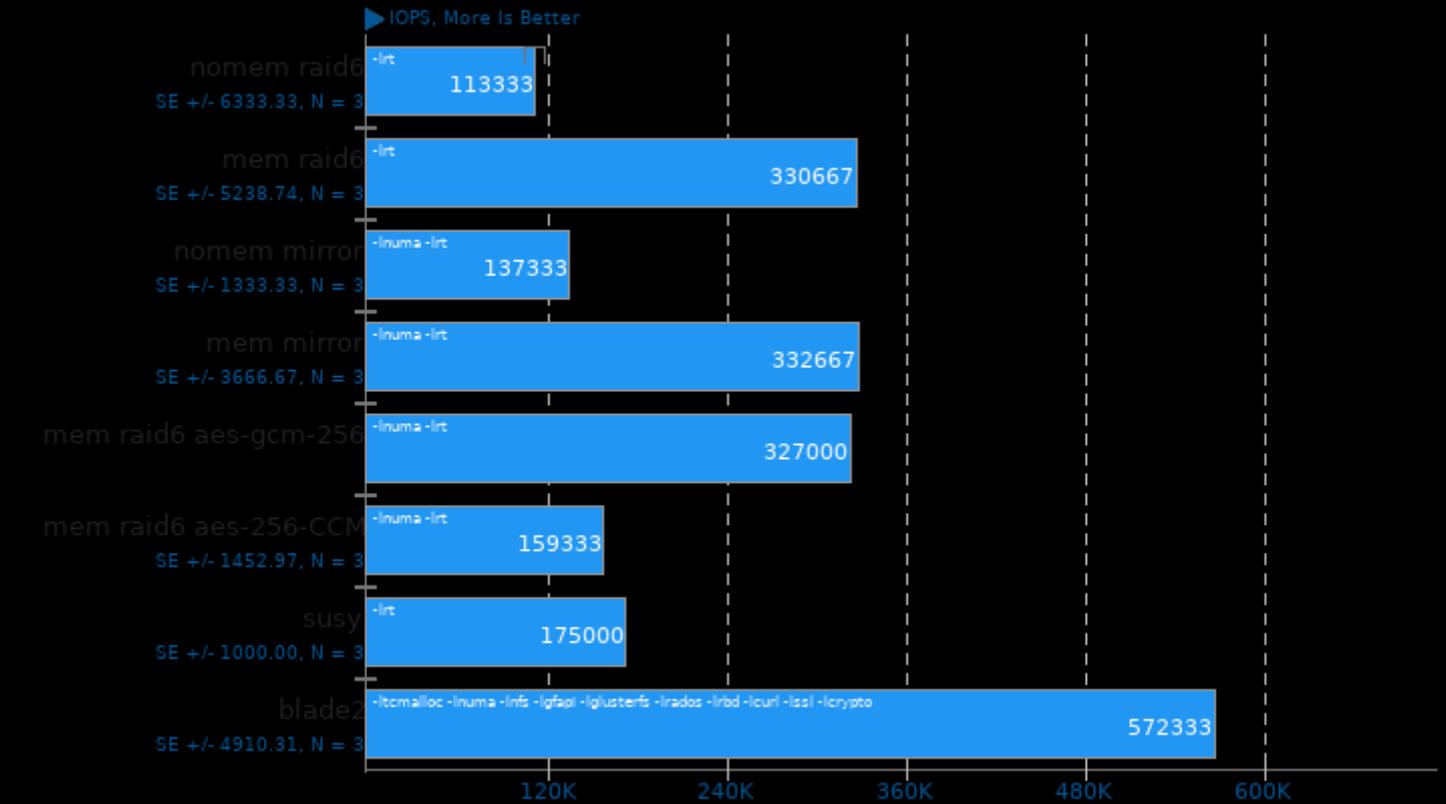
1. (CC) gcc options: -rdynamic -lz -pthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U\_FORTIFY\_SOURCE -march=native



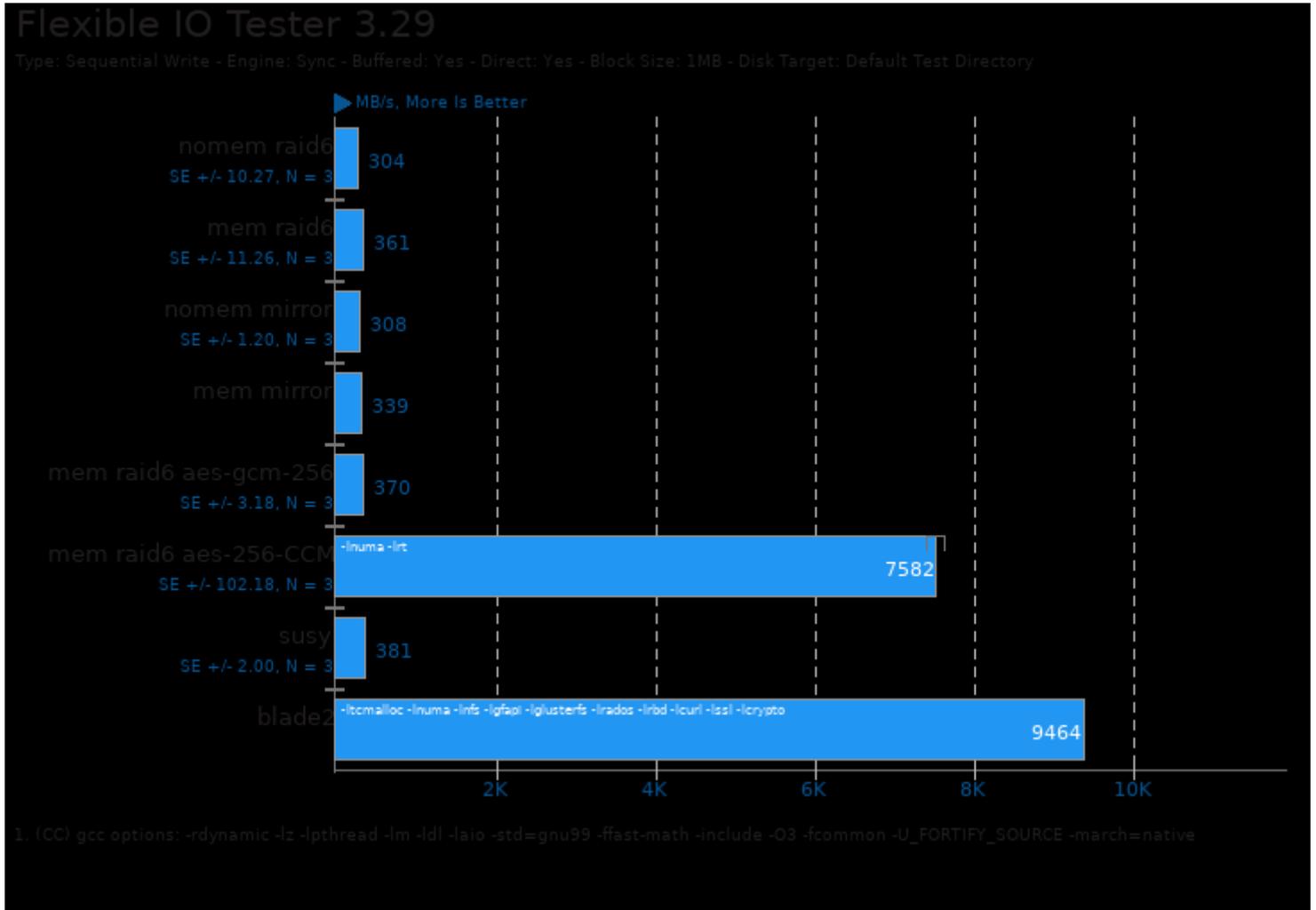


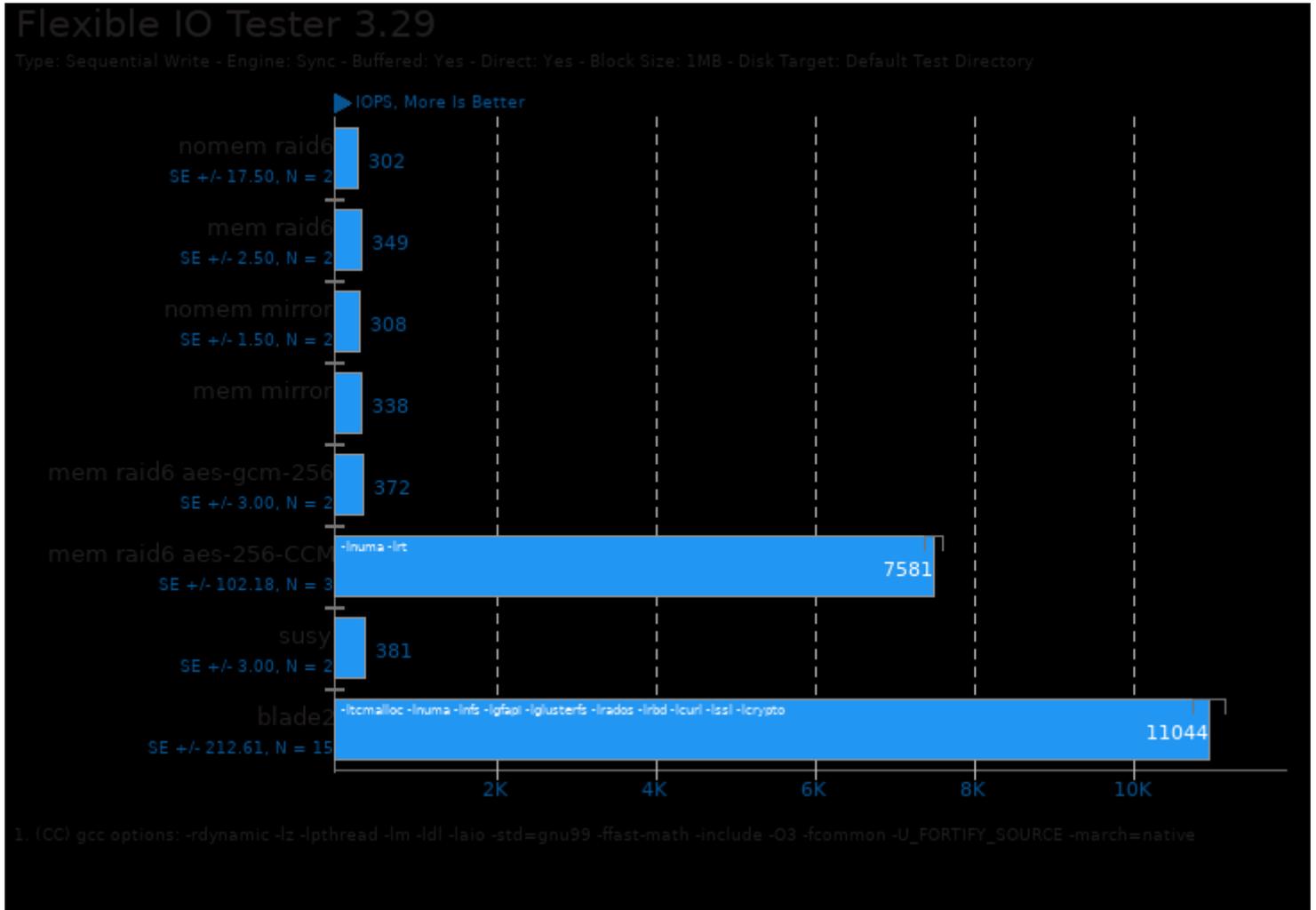
# Flexible IO Tester 3.29

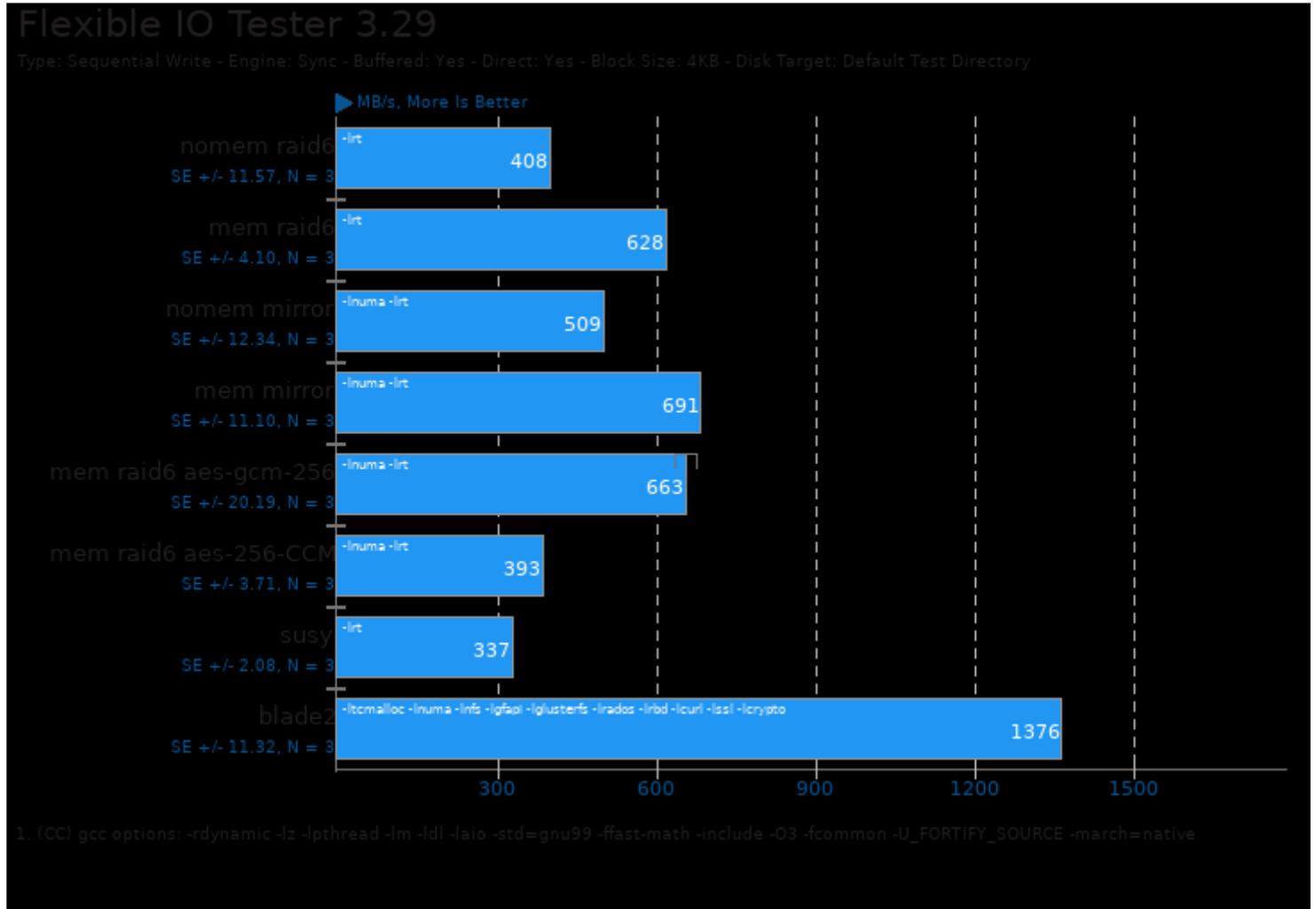
Type: Sequential Read - Engine: Sync - Buffered: Yes - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory

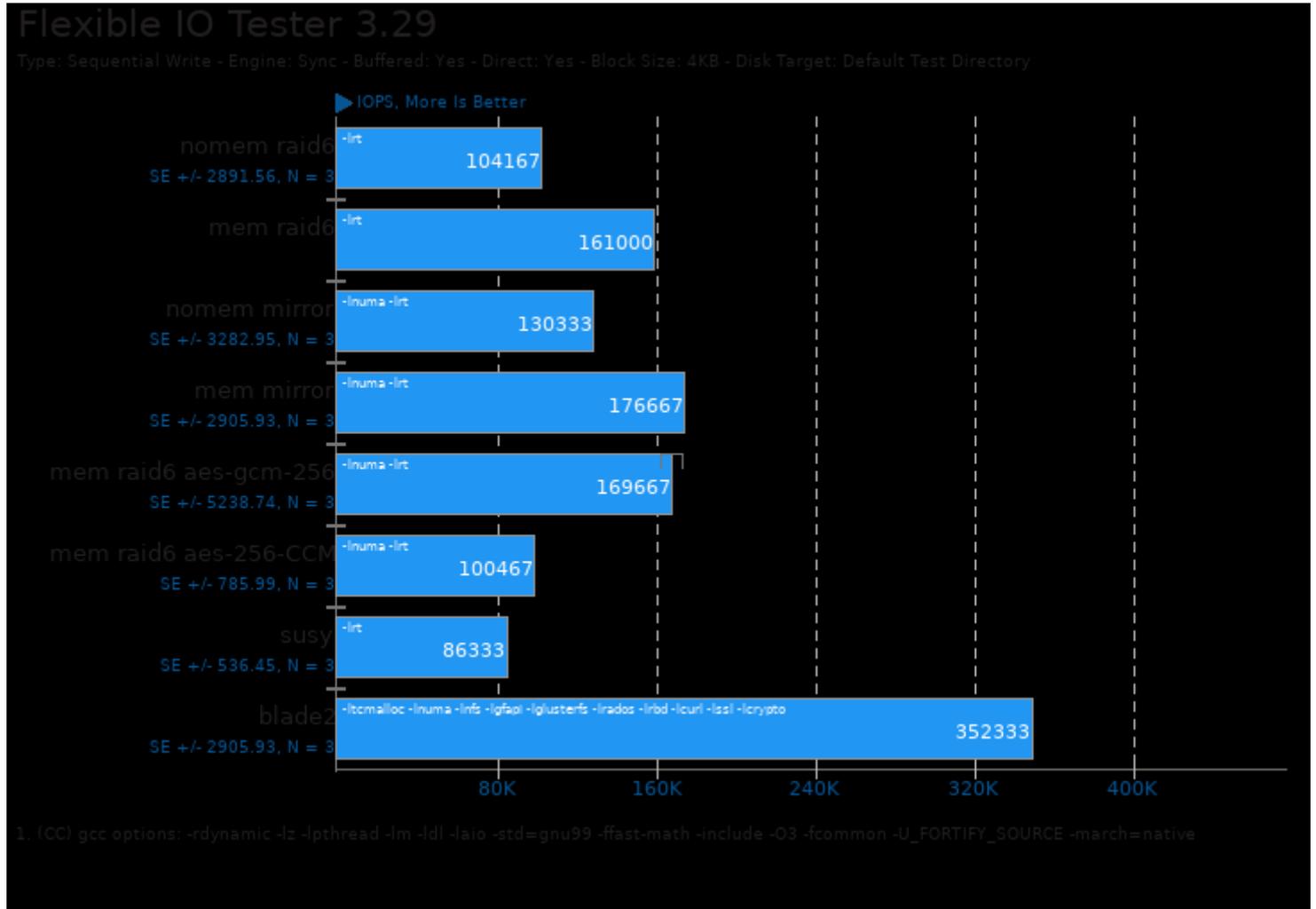


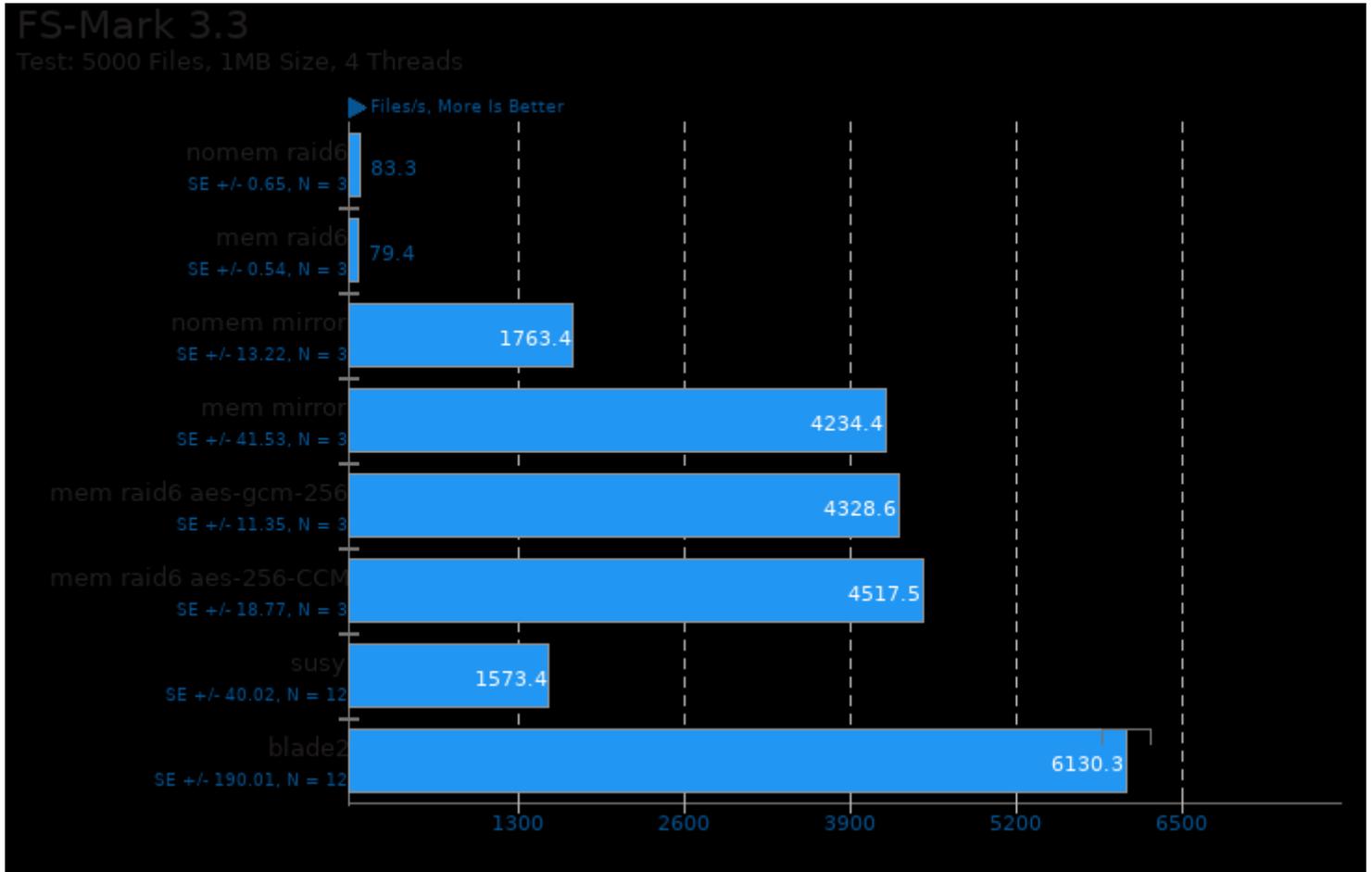
1. (GCC) gcc options: -rdynamic -lz -pthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U\_FORTIFY\_SOURCE -march=native

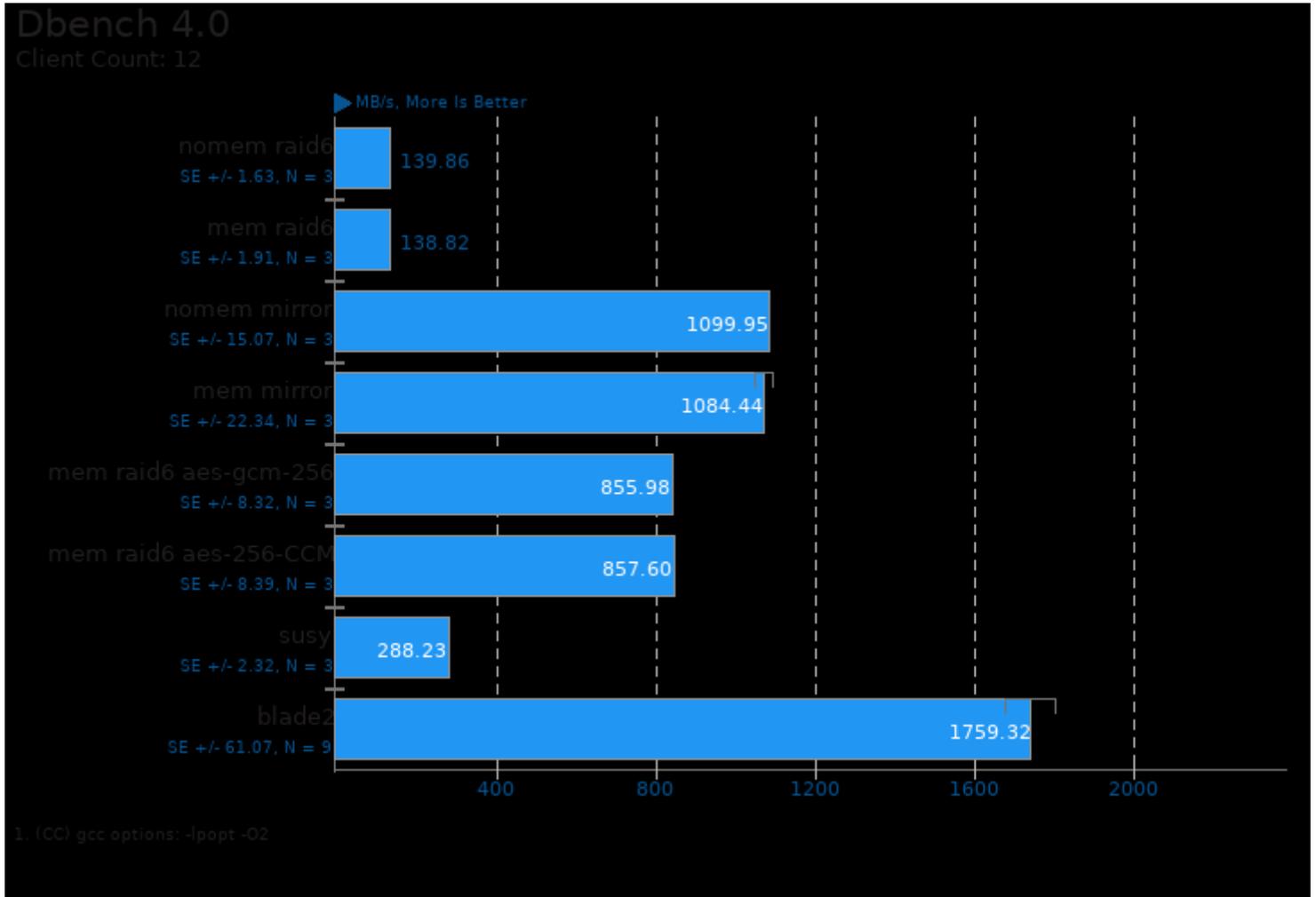


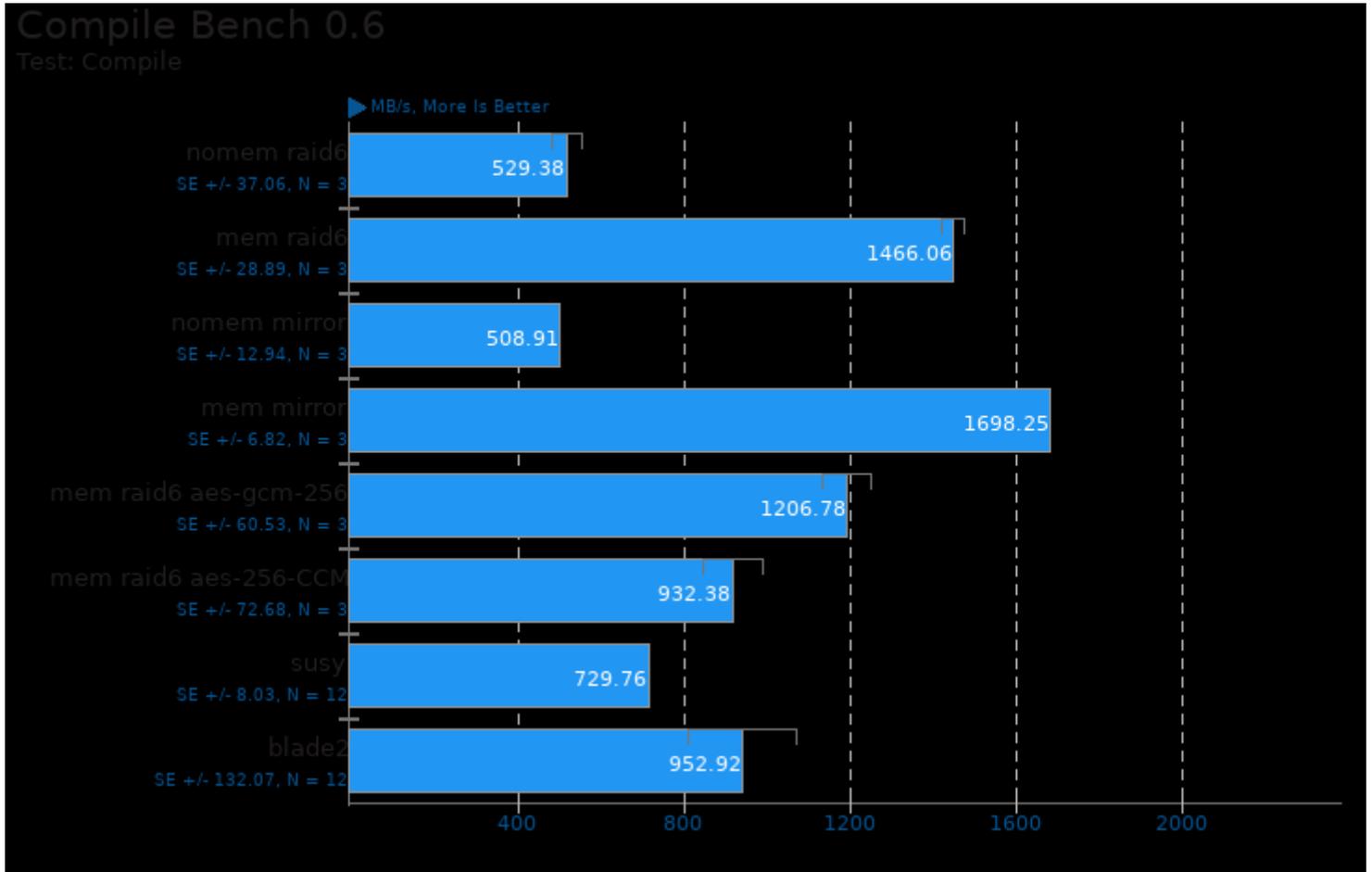


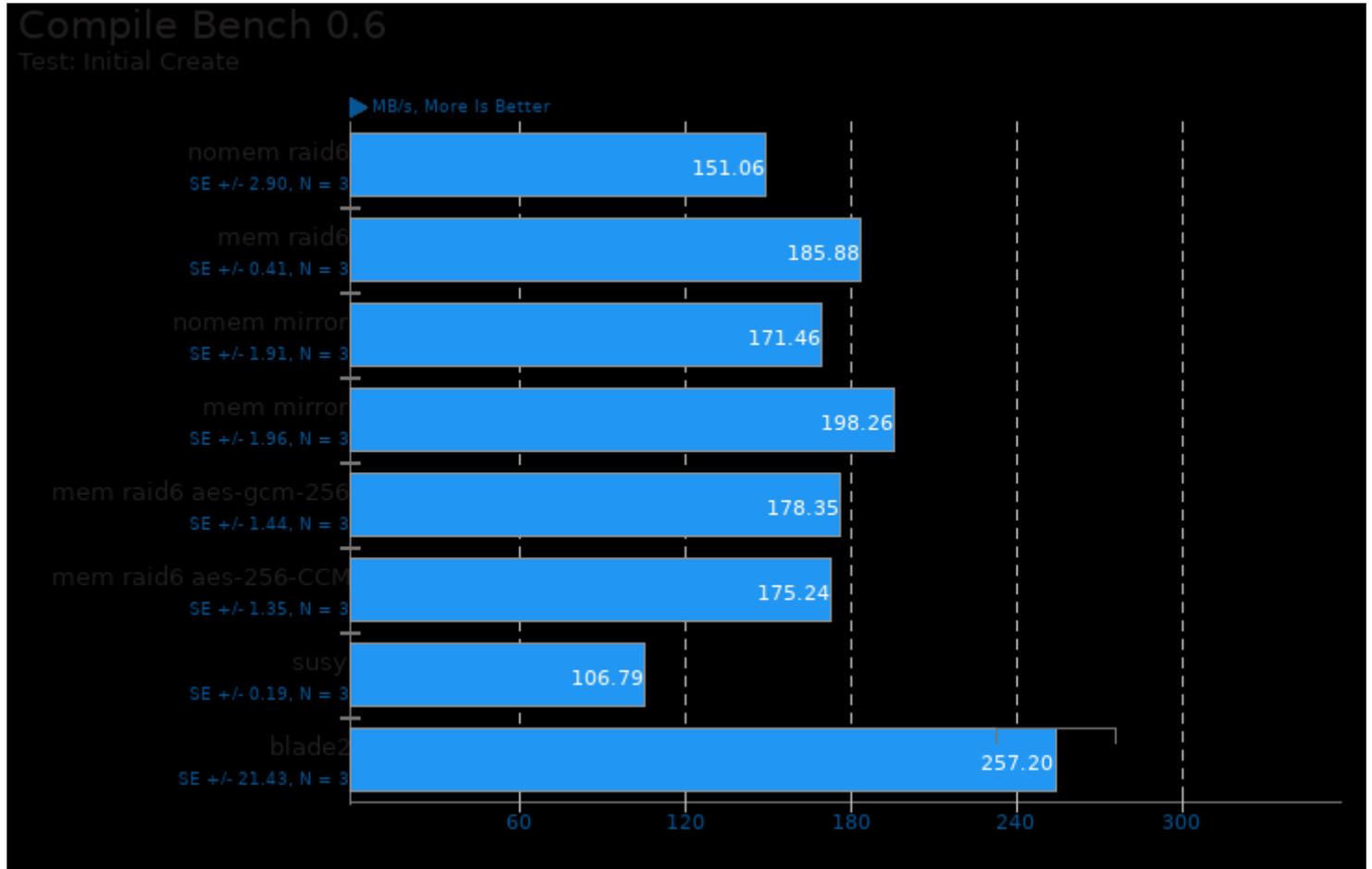


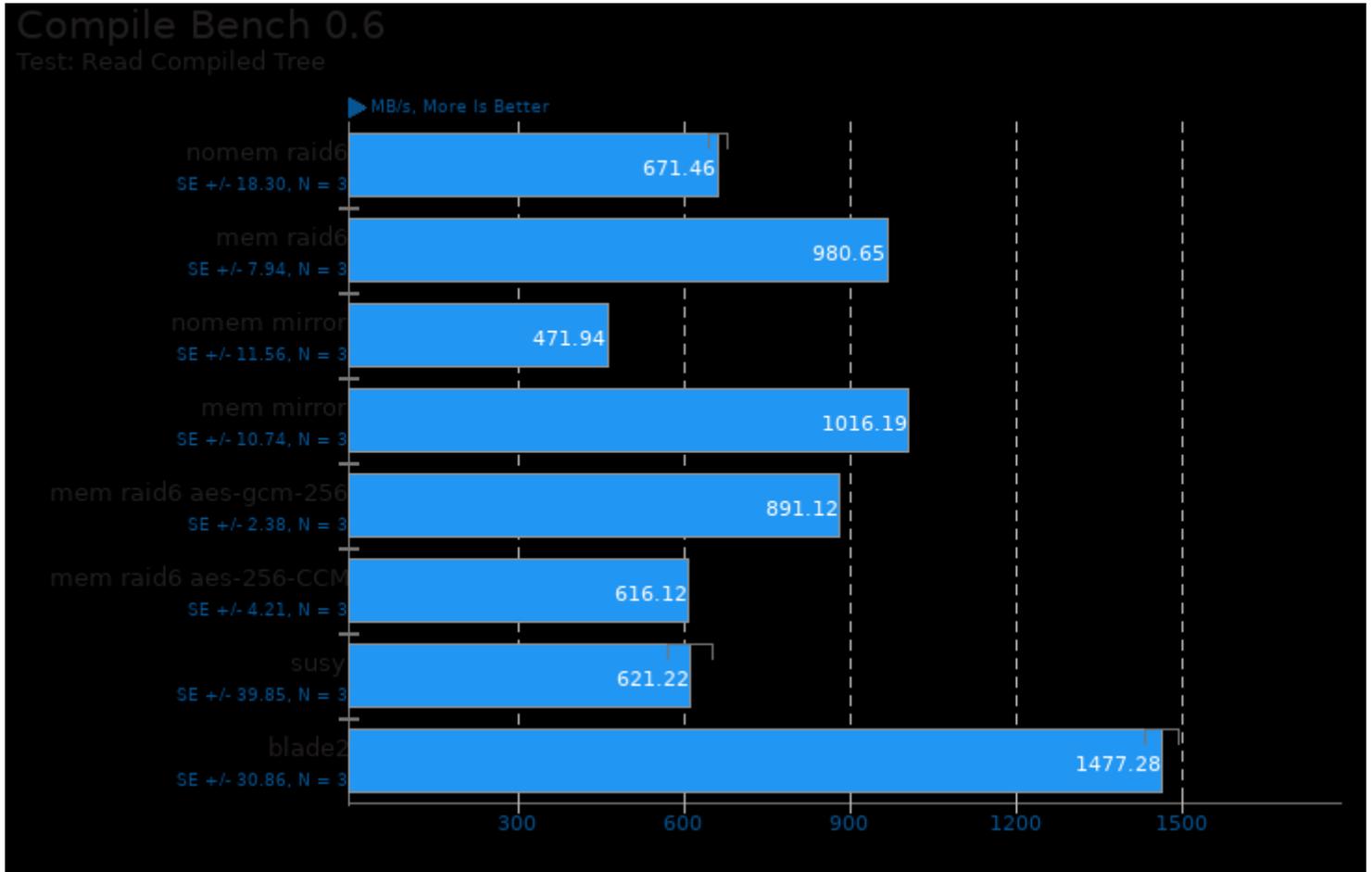


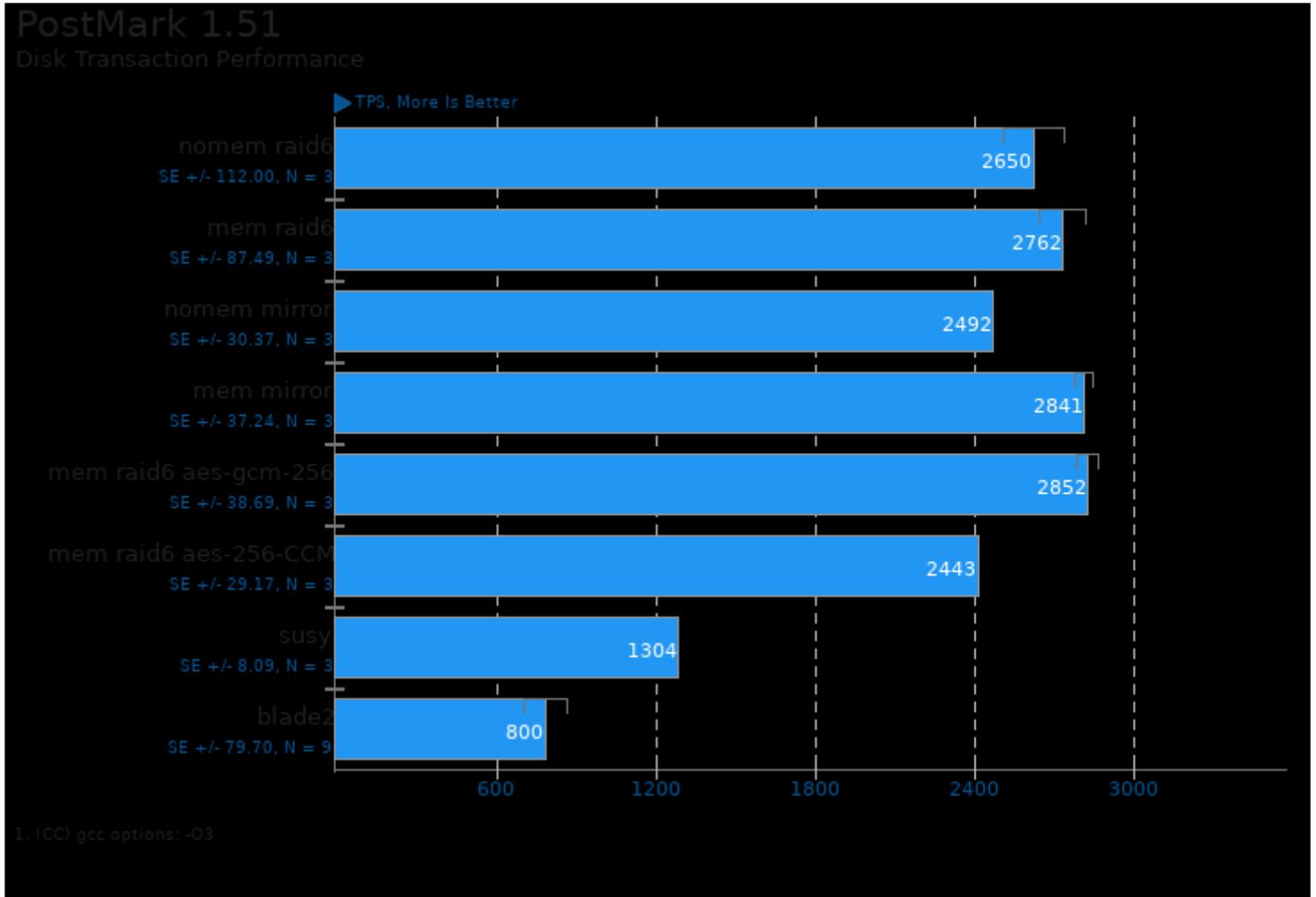












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