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perrymiller

VMware testing on Ubuntu 20.04 via the Phoronix Test Suite.

Test Systems:

old-server

Processor: 4 x Intel Xeon E5-2430 0 (7 Cores), Motherboard: Intel 440BX (6.00 BIOS), Chipset: Intel 440BX/ZX/DX, Memory: 1 x 8192 MB DRAM, Disk: 32GB Virtual disk, Graphics: VMware SVGA II, Network: VMware VMXNET3

OS: Ubuntu 20.04, Kernel: 5.4.0-90-generic (x86_64), Vulkan: 1.0.2, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1176x885, System Layer: VMware

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
Disk Notes: MQ-DEADLINE / relatime,rw / Block Size: 4096
Processor Notes: CPU Microcode: 0x714

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: 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: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

new-server

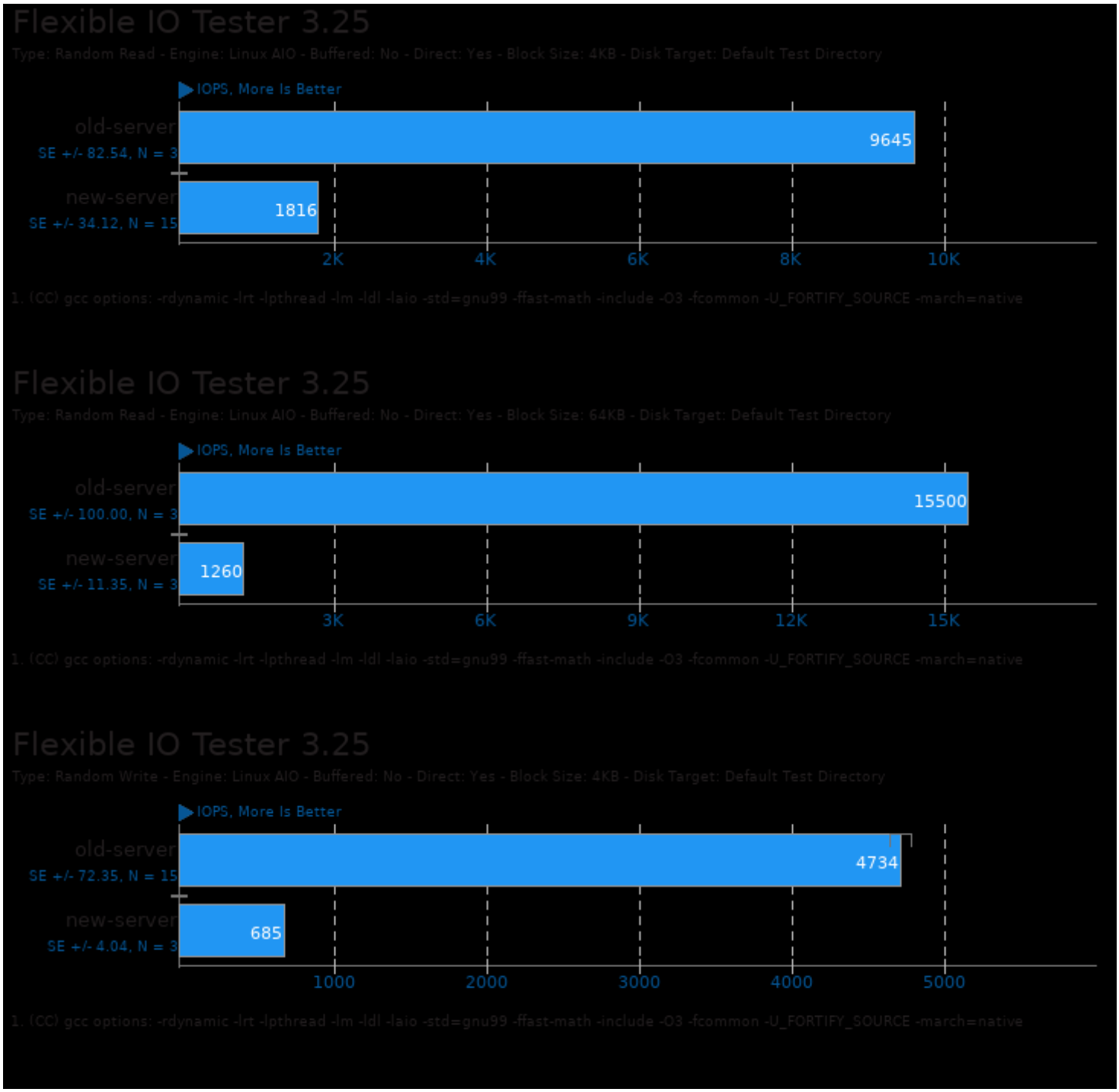
Processor: 4 x Intel Xeon E5-2620 v4 (7 Cores), Motherboard: Intel 440BX (6.00 BIOS), Chipset: Intel 440BX/ZX/DX, Memory: 1 x 8192 MB DRAM, Disk: 32GB Virtual disk, Graphics: VMware SVGA II, Network: VMware VMXNET3

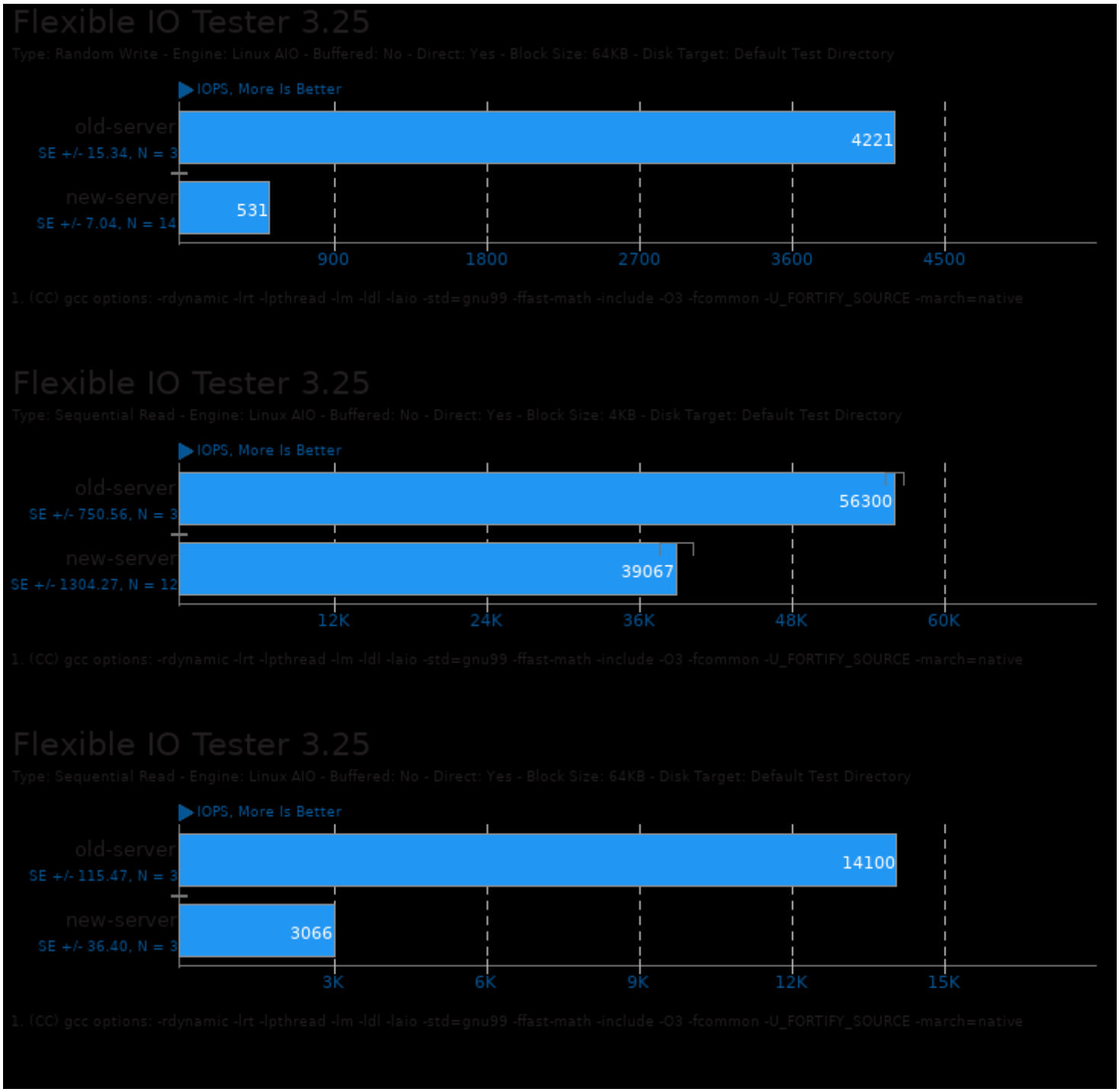
OS: Ubuntu 20.04, Kernel: 5.4.0-90-generic (x86_64), Vulkan: 1.0.2, Compiler: GCC 9.3.0, File-System: ext4, Screen Resolution: 1176x885, System Layer: VMware

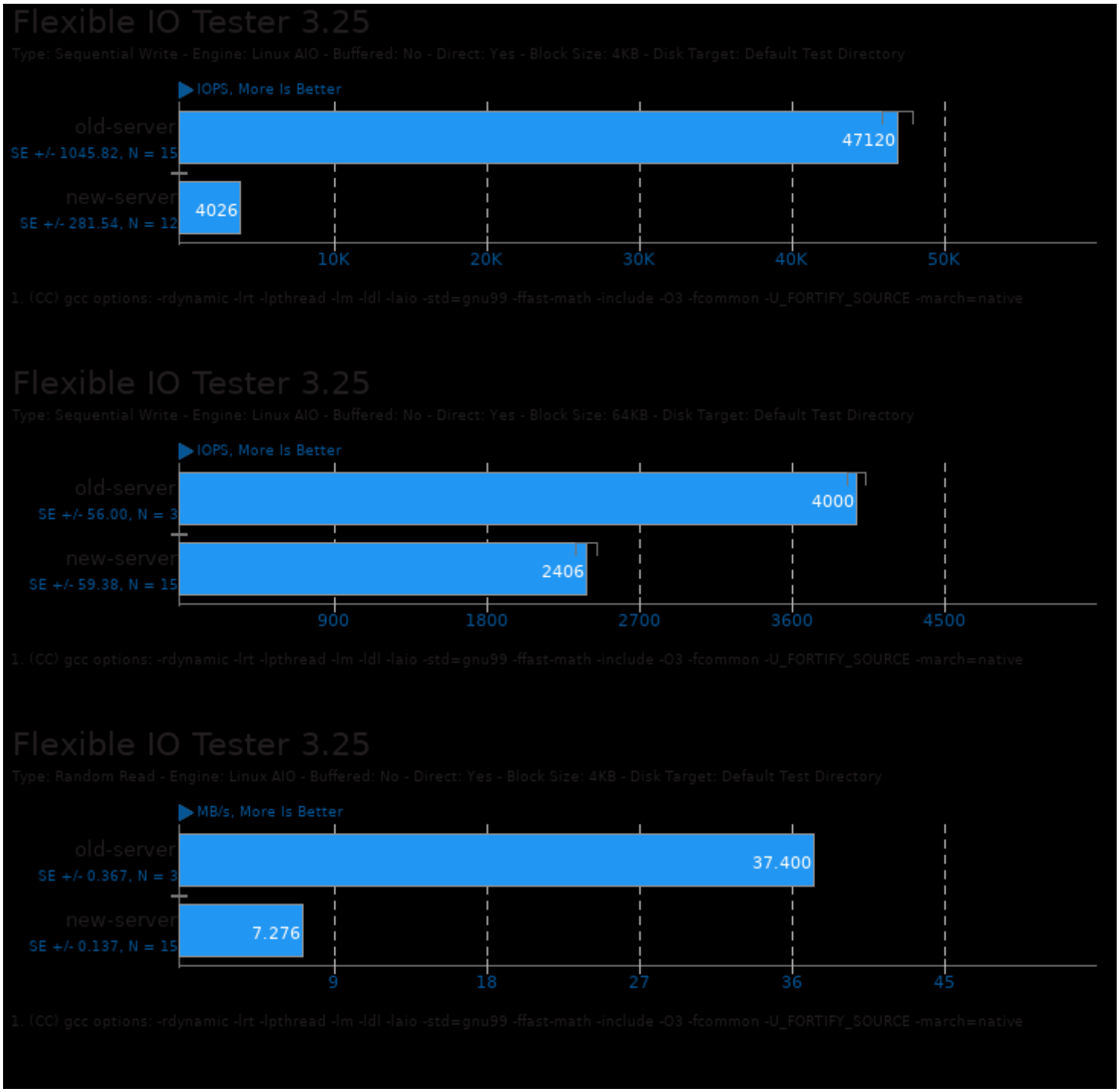
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Disk Notes: MQ-DEADLINE / relatime,rw / Block Size: 4096
Processor Notes: CPU Microcode: 0xb00003e
Security Notes: itlb_multihit: KVM: Vulnerable + l1tf: Mitigation of PTE Inversion + mds: Mitigation of Clear buffers; SMT Host state unknown + meltdown: 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: disabled RSB filling + srbds: Not affected + tsx_async_abort: Not affected

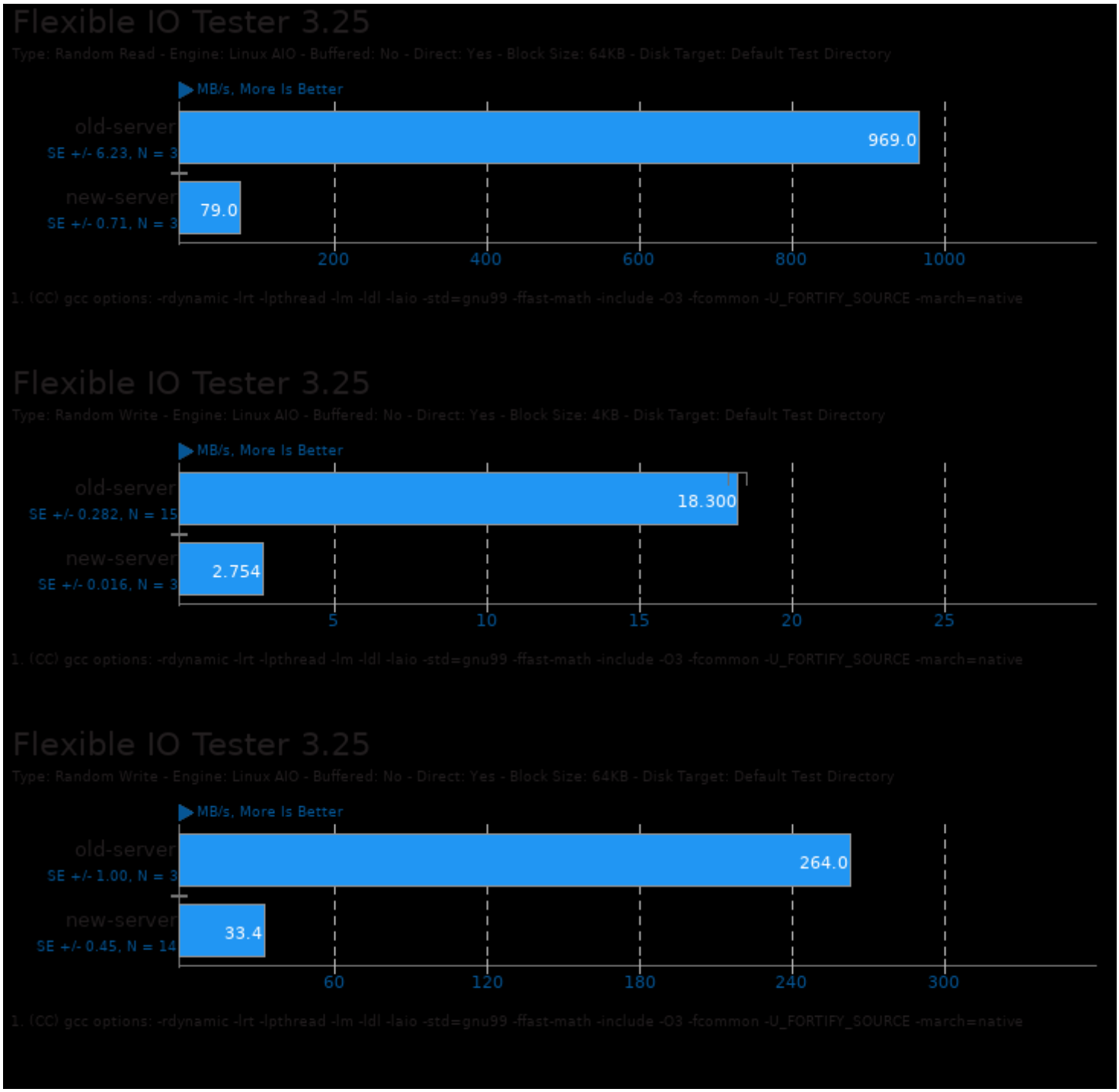
	old-server	new-server
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB (IOPS)	**9645**	**1816**
Normalized	100%	18.83%
Standard Deviation	1.5%	7.3%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 64KB (IOPS)	**15500**	**1260**
Normalized	100%	8.13%
Standard Deviation	1.1%	1.6%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB (IOPS)	**4734**	**685**
Normalized	100%	14.47%
Standard Deviation	5.9%	1%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 64KB (IOPS)	**4221**	**531**
Normalized	100%	12.58%
Standard Deviation	0.6%	5%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB (IOPS)	**56300**	**39067**
Normalized	100%	69.39%
Standard Deviation	2.3%	11.6%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 64KB (IOPS)	**14100**	**3066**
Normalized	100%	21.74%
Standard Deviation	1.4%	2.1%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB (IOPS)	**47120**	**4026**
Normalized	100%	8.54%

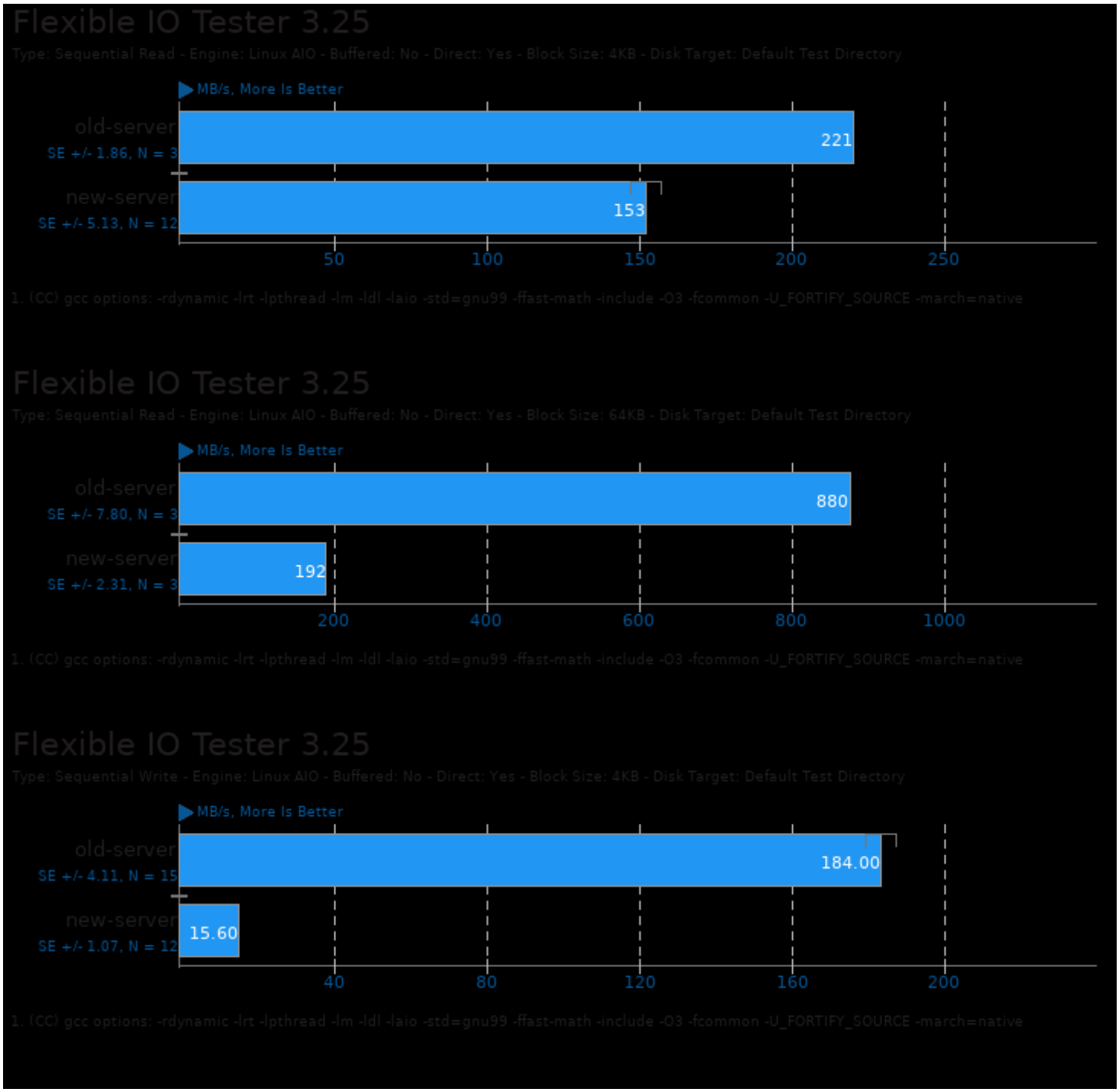
Standard Deviation	8.6%	24.2%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 64KB (IOPS)	**4000**	**2406**
Normalized	100%	60.15%
Standard Deviation	2.4%	9.6%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 4KB (MB/s)	**37.4**	**7.276**
Normalized	100%	19.45%
Standard Deviation	1.7%	7.3%
Flexible IO Tester - Rand Read - Linux AIO - No - Yes - 64KB (MB/s)	**969**	**79.0**
Normalized	100%	8.15%
Standard Deviation	1.1%	1.6%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 4KB (MB/s)	**18.3**	**2.754**
Normalized	100%	15.05%
Standard Deviation	6%	1%
Flexible IO Tester - Rand Write - Linux AIO - No - Yes - 64KB (MB/s)	**264**	**33.4**
Normalized	100%	12.65%
Standard Deviation	0.7%	5%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 4KB (MB/s)	**221**	**153**
Normalized	100%	69.23%
Standard Deviation	1.5%	11.6%
Flexible IO Tester - Seq Read - Linux AIO - No - Yes - 64KB (MB/s)	**880**	**192**
Normalized	100%	21.82%
Standard Deviation	1.5%	2.1%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 4KB (MB/s)	**184**	**15.597**
Normalized	100%	8.48%
Standard Deviation	8.6%	23.7%
Flexible IO Tester - Seq Write - Linux AIO - No - Yes - 64KB (MB/s)	**250**	**151**
Normalized	100%	60.4%
Standard Deviation	2.4%	9.6%

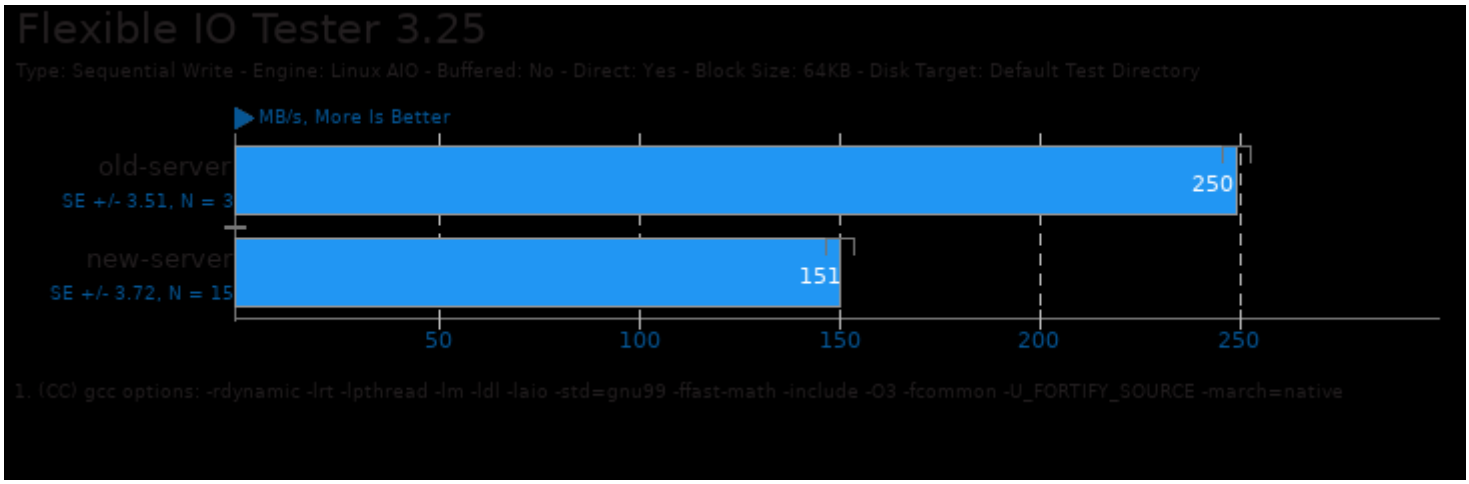

Flexible IO Tester 3.25
Type: Random Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
old-server
SE +/- 82.54, N = 3
9645
new-server
SE +/- 34.12, N = 15
1816
2K
4K
6K
8K
10K
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native
Flexible IO Tester 3.25
Type: Random Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory
IOPS, More Is Better
old-server
SE +/- 100.00, N = 3
15500
new-server
SE +/- 11.35, N = 3
1260
3K
6K
9K
12K
15K
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native
Flexible IO Tester 3.25
Type: Random Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
old-server
SE +/- 72.35, N = 15
4734
new-server
SE +/- 4.04, N = 3
685
1000
2000
3000
4000
5000
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native


Flexible IO Tester 3.25
Type: Random Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory
IOPS, More Is Better
old-server
SE +/- 15.34, N = 3
4221
new-server
SE +/- 7.04, N = 14
531
900
1800
2700
3600
4500
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native
Flexible IO Tester 3.25
Type: Sequential Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
old-server
SE +/- 750.56, N = 3
56300
new-server
SE +/- 1304.27, N = 12
39067
12K
24K
36K
48K
60K
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native
Flexible IO Tester 3.25
Type: Sequential Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory
IOPS, More Is Better
old-server
SE +/- 115.47, N = 3
14100
new-server
SE +/- 36.40, N = 3
3066
3K
6K
9K
12K
15K
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native


Flexible IO Tester 3.25
Type: Sequential Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
IOPS, More Is Better
old-server
SE +/- 1045.82, N = 15
47120
new-server
SE +/- 281.54, N = 12
4026
10K
20K
30K
40K
50K
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native
Flexible IO Tester 3.25
Type: Sequential Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory
IOPS, More Is Better
old-server
SE +/- 56.00, N = 3
4000
new-server
SE +/- 59.38, N = 15
2406
900
1800
2700
3600
4500
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native
Flexible IO Tester 3.25
Type: Random Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
old-server
SE +/- 0.367, N = 3
37.400
new-server
SE +/- 0.137, N = 15
7.276
9
18
27
36
45
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native


Flexible IO Tester 3.25
Type: Random Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory
MB/s, More Is Better
old-server
SE +/- 6.23, N = 3
969.0
new-server
SE +/- 0.71, N = 3
79.0
200
400
600
800
1000
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native
Flexible IO Tester 3.25
Type: Random Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
old-server
SE +/- 0.282, N = 15
18.300
new-server
SE +/- 0.016, N = 3
2.754
5
10
15
20
25
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native
Flexible IO Tester 3.25
Type: Random Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory
MB/s, More Is Better
old-server
SE +/- 1.00, N = 3
264.0
new-server
SE +/- 0.45, N = 14
33.4
60
120
180
240
300
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native


Flexible IO Tester 3.25
Type: Sequential Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
old-server
SE +/- 1.86, N = 3
221
new-server
SE +/- 5.13, N = 12
153
50
100
150
200
250
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native
Flexible IO Tester 3.25
Type: Sequential Read - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 64KB - Disk Target: Default Test Directory
MB/s, More Is Better
old-server
SE +/- 7.80, N = 3
880
new-server
SE +/- 2.31, N = 3
192
200
400
600
800
1000
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native
Flexible IO Tester 3.25
Type: Sequential Write - Engine: Linux AIO - Buffered: No - Direct: Yes - Block Size: 4KB - Disk Target: Default Test Directory
MB/s, More Is Better
old-server
SE +/- 4.11, N = 15
184.00
new-server
SE +/- 1.07, N = 12
15.60
40
80
120
160
200
1. (CC) gcc options: -rdynamic -lrt -lpthread -lm -ldl -laio -std=gnu99 -ffast-math -include -O3 -fcommon -U_FORTIFY_SOURCE -march=native



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