# SPEC CPU® 2017 Integer Rate Result

**Supermicro**

A+ Server 1114S-WN10RT  
(H12SSW-NTR, AMD EPYC 7313P)

<table>
<thead>
<tr>
<th>SPECrate® 2017_int_base</th>
<th>155</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate® 2017_int_peak</td>
<td>159</td>
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</table>

**CPU2017 License:** 001176  
**Test Sponsor:** Supermicro  
**Tested by:** Supermicro

**Test Date:** Oct-2021  
**Hardware Availability:** Mar-2021  
**Software Availability:** Sep-2021

### Copies

<table>
<thead>
<tr>
<th>Benchmark</th>
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<tr>
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<td>83.2</td>
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</tr>
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### Hardware

**CPU Name:** AMD EPYC 7313P  
**Max MHz:** 3700  
**Nominal:** 3000  
**Enabled:** 16 cores, 1 chip, 2 threads/core  
**Orderable:** 1 chip  
**Cache L1:** 32 KB I + 32 KB D on chip per core  
**L2:** 512 KB I+D on chip per core  
**L3:** 128 MB I+D on chip per chip, 32 MB shared / 4 cores  
**Other:** None  
**Memory:** 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R)  
**Storage:** 1 x 200 GB SATA III SSD  
**Other:** None

### Software

**OS:** Ubuntu 20.04.3 LTS  
**Compiler:** Kernel 5.4.0-88-generic  
**Parallel:** No  
**Firmware:** Version 2.1 released May-2021  
**File System:** ext4  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** 32/64-bit  
**Other:** jemalloc: jemalloc memory allocator library v5.1.0  
**Power Management:** BIOS set to prefer performance at the cost of additional power usage.
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

The AMD64 AOCC Compiler Suite is available at http://developer.amd.com/amd-aocc/

Submit Notes

The config file option 'submit' was used. 'numactl' was used to bind copies to the cores. See the configuration file for details.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage, 'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

(Continued on next page)
### Operating System Notes (Continued)

To enable Transparent Hugepages (THP) only on request for base runs, 'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To enable THP for all allocations for peak runs, 'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and 'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH =
    "/home/cpu2017/amd_rate_aocc300_milan_B_lib/lib;/home/cpu2017/amd_rate_aocc300_milan_B_lib/lib32:"
MALLOC_CONF = "retain:true"
```

Environment variables set by runcpu during the 523.xalancbmk_r peak run:

```
MALLOC_CONF = "thp:never"
```

### General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TIB Memory using OpenSUSE 15.2

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

### Platform Notes

BIOS Settings:
- Determinism Control = Manual
- Determinism Slider = Power
- cTDP Control = Manual
- cTDP = 180
- Package Power Limit Control = Manual
- Package Power Limit = 180
Platform Notes (Continued)

APBDIS = 1
NUMA Nodes Per Socket = NPS4

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aaca64d
running on h12ssw-7313p Sat Oct 9 00:43:38 2021

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : AMD EPYC 7313P 16-Core Processor
1  "physical id"s (chips)
32 "processors"
core, siblings (Caution: counting these is hw and system dependent. The following
excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 16
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu from util-linux 2.34:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 48 bits physical, 48 bits virtual
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 1
NUMA node(s) 4
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7313P 16-Core Processor
Stepping: 1
Frequency boost: enabled
CPU MHz: 1796.854
CPU max MHz: 3000.0000
CPU min MHz: 1500.0000
BogoMIPS: 5999.99
Virtualization: AMD-V
L1d cache: 512 KiB
L1i cache: 512 KiB
L2 cache: 8 MiB
L3 cache: 128 MiB

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Supermicro
A+ Server 1114S-WN10RT
(H12SSW-NTR, AMD EPYC 7313P)

CPU2017 License: 001176
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SPECrate®2017_int_base = 155
SPECrate®2017_int_peak = 159

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Platform Notes (Continued)

NUMA node0 CPU(s): 0-3,16-19
NUMA node1 CPU(s): 4-7,20-23
NUMA node2 CPU(s): 8-11,24-27
NUMA node3 CPU(s): 12-15,28-31
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
 pge mca cmov pat pse36 cclflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
 pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
 aperfmperf pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 movbe popcnt aes
 xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
 misalignsse 3nowprefetch osuw ibs kinter wdt tce topoext perfctr_core perfctr_nb
 bpower perfctr_l1d cld perfctr_l1i cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
 ibpb stibp vmmcall fsgsbse base mlk axv2 smp bmi2 erms invpcid cmp rdt_a rdseed adx
 smap clflushopt clwb sha_ni xsaveopt xsaves xsaveopt xsaveopt xsaveopt xsaveopt xsaveopt xsaveopt
 From lscpu --cache:
 NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL
 L1d 32K 512K 8 Data 1
 L1i 32K 512K 8 Instruction 1
 L2 512K 8M 8 Unified 2
 L3 32M 256M 16 Unified 3

/proc/cpuinfo cache data
 cache size : 512 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
 node 0 cpus: 0 1 2 3 16 17 18 19
 node 0 size: 128897 MB
 node 0 free: 127636 MB
 node 1 cpus: 4 5 6 7 20 21 22 23
 node 1 size: 128997 MB

(Continued on next page)
Platform Notes (Continued)

node 1 free: 128732 MB
node 2 cpus: 8 9 10 11 24 25 26 27
node 2 size: 129021 MB
node 2 free: 125264 MB
node 3 cpus: 12 13 14 15 28 29 30 31
node 3 size: 129009 MB
node 3 free: 122176 MB
node distances:
node 0 1 2 3
0: 10 12 12 12
1: 12 10 12 12
2: 12 12 10 12
3: 12 12 12 10

From /proc/meminfo
MemTotal:       528308380 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

/usr/bin/lsb_release -d
Ubuntu 20.04.3 LTS

From /etc/*release* /etc/*version*
debian_version: bullseye/sid
os-release:
NAME="Ubuntu"
VERSION="20.04.3 LTS (Focal Fossa)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 20.04.3 LTS"
VERSION_ID="20.04"
HOME_URL="https://www.ubuntu.com/
SUPPORT_URL="https://help.ubuntu.com/

uname -a:
Linux h12ssw-7313p 5.4.0-88-generic #99-Ubuntu SMP Thu Sep 23 17:29:00 UTC 2021 x86_64
x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected

(Continued on next page)
Platform Notes (Continued)

CVE-2018-3639 (Speculative Store Bypass):                Mitigation: Speculative Store
Disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):                      Mitigation: usercopy/swaps
barriers and __user pointer
sanitization
CVE-2017-5715 (Spectre variant 2):                      Mitigation: Full AMD retpoline,
IBPB: conditional, IBRS_FW, STIBP:
always-on, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort):                Not affected

run-level 3 Oct 8 11:32
SPEC is set to: /home/cpu2017

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      ext4  183G   22G  152G  13% /

From /sys/devices/virtual/dmi/id
Vendor:        Supermicro
Product:       Super Server
Serial:        0123456789

Additional information from dmidecode 3.2 follows. WARNING: Use caution when you
interpret this section. The 'dmidecode' program reads system data which is "intended to
allow hardware to be accurately determined", but the intent may not be met, as there are
frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
Memory:
  8x NO DIMM Unknown
  8x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200

BIOS:
  BIOS Vendor: American Megatrends Inc.
  BIOS Version: 2.1
  BIOS Date: 05/07/2021
  BIOS Revision: 5.22

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 502.gcc_r(peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0~Build#78 2020_12_10) (based on
LLVM Mirror.Version.12.0.0)

(Continued on next page)
**Compiler Version Notes (Continued)**

| Test Date: Oct-2021 | Hardware Availability: Mar-2021 | Software Availability: Sep-2021 |

Target: i386-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

| AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin |

| AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)  
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Compiler Version Notes (Continued)

==============================================================================
C++    | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)  
       | 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
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C++    | 523.xalancbmk_r(peak)
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       | 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
==============================================================================
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on  
LLVM Mirror.Version.12.0.0)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
==============================================================================
Fortran | 548.exchange2_r(base, peak)
==============================================================================
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on  
LLVM Mirror.Version.12.0.0)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

Base Compiler Invocation

C benchmarks:  
clang

(Continued on next page)
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**Supermicro**

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### Base Compiler Invocation (Continued)

C++ benchmarks:

```
c++
```

Fortran benchmarks:

```
flang
```

### Base Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64  
502.gcc_r: -DSPEC_LP64  
505.mcf_r: -DSPEC_LP64  
520.omnetpp_r: -DSPEC_LP64  
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64  
525.x264_r: -DSPEC_LP64  
531.deepsjeng_r: -DSPEC_LP64  
541.leela_r: -DSPEC_LP64  
548.exchange2_r: -DSPEC_LP64  
557.xz_r: -DSPEC_LP64

### Base Optimization Flags

C benchmarks:

```
-m64 -Wl,-allow-multiple-definition -Wl,-mllvm -Wl,-enable-licm-vrp  
-flto -Wl,-mllvm -Wl,-region-vectorize  
-Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math  
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5  
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000  
-fremap-arrays -mllvm -function-specialize -flv-function-specialization  
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true  
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs  
-landlibm -ljemalloc -flang -lflangrti
```

C++ benchmarks:

```
-m64 -std=c++98 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -flto  
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math  
-march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch
```

(Continued on next page)
**Base Optimization Flags (Continued)**

C++ benchmarks (continued):
- `mllvm -unroll-threshold=100 -finline-aggressive`
- `flv-function-specialization -mllvm -loop-unswitch-threshold=200000`
- `mllvm -reroll-loops -mllvm -aggressive-loop-unswitch`
- `mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3`
- `mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false`
- `-z muldefs -mllvm -do-block-reorder=aggressive`
- `fvirtual-function-elimination -fvisibility=hidden -lamlilib -ljemalloc -lflang -lflangrti`

Fortran benchmarks:
- `-m64 -Wl,-mllvm -Wl,-inline-recursion=4`
- `-Wl,-mllvm -Wl,-isr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split`
- `-flto -Wl,-mllvm -Wl,-region-vectorize`
- `-Wl,-mllvm -Wl,-function-specialize`
- `-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math`
- `-march=znver3 -fveclib=AMDLIBM -z muldefs -mllvm -unroll-aggressive`
- `-mllvm -unroll-threshold=500 -lamlilib -ljemalloc -lflang -lflangrti`

**Base Other Flags**

C benchmarks:
- `Wno-unused-command-line-argument`

C++ benchmarks:
- `Wno-unused-command-line-argument`

**Peak Compiler Invocation**

C benchmarks:
- `clang`

C++ benchmarks:
- `clang++`

Fortran benchmarks:
- `flang`
SPEC CPU®2017 Integer Rate Result

Supermicro
A+ Server 1114S-WN10RT
(H12SSW-NTR, AMD EPYC 7313P)

SPECrate®2017_int_base = 155
SPECrate®2017_int_peak = 159

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Oct-2021
Hardware Availability: Mar-2021
Software Availability: Sep-2021

Peak Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -m64 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-lcim-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-fprofile-instr-generate(pass 1)
-fprofile-instr-use(pass 2) -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7
-mlvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mlvm -inline-threshold=1000
-mlvm -enable-gvn-hoist -mlvm -global-vectorize-slp=false
-mlvm -function-specialize -mlvm -enable-lcim-vrp
-mlvm -reduce-array-computations=3 -lamdlibm -ljemalloc

502.gcc_r: -m32 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-lcim-vrp -flto
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7
-mlvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mlvm -inline-threshold=1000
-mlvm -enable-gvn-hoist -mlvm -global-vectorize-slp=true
-mlvm -function-specialize -mlvm -enable-lcim-vrp
-mlvm -reduce-array-computations=3 -fgnu89-inline
-ljemalloc

505.mcf_r: basepeak = yes
525.x264_r: basepeak = yes

(Continued on next page)
Peak Optimization Flags (Continued)

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: -m64 -std=c++98
-W1,-mlvm -W1,-do-block-reorder=aggressive -flto
-W1,-mlvm -W1,-function-specialize
-W1,-mlvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlvm -W1,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -finline-aggressive
-mlvm -unroll-threshold=100 -flto -function-specialization
-mlvm -enable-licm-vrp -mlvm -reroll-loops
-mlvm -aggressive-loop-unswitch
-mlvm -reduce-array-computations=3
-mlvm -global-vectorize-slp=true
-mlvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -ljemalloc

523.xalancbmk_r: -m32 -W1,-mlvm -W1,-do-block-reorder=aggressive -flto
-W1,-mlvm -W1,-function-specialize
-W1,-mlvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlvm -W1,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -finline-aggressive
-mlvm -unroll-threshold=100 -flto -function-specialization
-mlvm -enable-licm-vrp -mlvm -reroll-loops
-mlvm -aggressive-loop-unswitch
-mlvm -reduce-array-computations=3
-mlvm -global-vectorize-slp=true
-mlvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-ljemalloc

531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

Fortran benchmarks:

548.exchange2_r: basepeak = yes
SPEC CPU®2017 Integer Rate Result

Supermicro
A+ Server 1114S-WN10RT  
(H12SSW-NTR, AMD EPYC 7313P)  

SPECrate®2017_int_base = 155
SPECrate®2017_int_peak = 159

CPU2017 License: 001176  
Test Date: Oct-2021  
Test Sponsor: Supermicro  
Hardware Availability: Mar-2021  
Tested by: Supermicro  
Software Availability: Sep-2021

Peak Other Flags

C benchmarks (except as noted below):
  -Wno-unused-command-line-argument

502.gcc_r: -L/usr/lib -Wno-unused-command-line-argument  
-L/sppo/bin/cpu2017v115aocc3/amd_rate_aocc300_milan_A_lib/32

C++ benchmarks (except as noted below):
  -Wno-unused-command-line-argument

523.xalancbmk_r: -L/usr/lib -Wno-unused-command-line-argument  
-L/sppo/bin/cpu2017v115aocc3/amd_rate_aocc300_milan_A_lib/32

The flags files that were used to format this result can be browsed at:

You can also download the XML flags sources by saving the following links:

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