ASUSTeK Computer Inc.
ASUS RS500A-E10(KRPA-U16) Server System
2.00 GHz, AMD EPYC 7662

SPECspeed®2017_int_base = 8.84
SPECspeed®2017_int_peak = 9.07

Hardware
CPU Name: AMD EPYC 7662
Max MHz: 3300
Nominal: 2000
Enabled: 64 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: 256 MB I+D on chip per chip, 16 MB shared / 4 cores
Other: None
Memory: 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R)
Storage: 1 x 240 GB SATA SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 15 SP1 (x86_64)
Kernel 4.12.14-195-default
Compiler: C/C++/Fortran: Version 2.0.0 of AOCC
Parallel: Yes
Firmware: Version 0501 released Nov-2019
File System: xfs
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 and OS set to prefer performance at the cost of additional power usage.
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>64</td>
<td>371</td>
<td>4.79</td>
<td>371</td>
<td>4.79</td>
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<td>602.gcc_s</td>
<td>64</td>
<td>410</td>
<td>9.71</td>
<td>410</td>
<td>9.72</td>
<td>409</td>
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<td>605.mcf_s</td>
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<td>313</td>
<td>15.1</td>
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<td>313</td>
<td>15.1</td>
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<tr>
<td>620.omnetpp_s</td>
<td>64</td>
<td>321</td>
<td>5.08</td>
<td>320</td>
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<td>5.09</td>
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<td>623.xalanchmk_s</td>
<td>64</td>
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<td>150</td>
<td>9.42</td>
<td>153</td>
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<td>625.x264_s</td>
<td>64</td>
<td>141</td>
<td>12.5</td>
<td>141</td>
<td>12.5</td>
<td>142</td>
<td>12.5</td>
<td>1</td>
<td>138</td>
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<tr>
<td>631.deepsjeng_s</td>
<td>64</td>
<td>294</td>
<td>4.87</td>
<td>294</td>
<td>4.87</td>
<td>295</td>
<td>4.86</td>
<td>1</td>
<td>288</td>
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<tr>
<td>641.leela_s</td>
<td>64</td>
<td>406</td>
<td>4.20</td>
<td>405</td>
<td>4.22</td>
<td>405</td>
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<td>1</td>
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<tr>
<td>648.exchange2_s</td>
<td>64</td>
<td>178</td>
<td>16.5</td>
<td>178</td>
<td>16.5</td>
<td>178</td>
<td>16.5</td>
<td>1</td>
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<td>657.xz_s</td>
<td>64</td>
<td>298</td>
<td>20.8</td>
<td>298</td>
<td>20.8</td>
<td>298</td>
<td>20.7</td>
<td>64</td>
<td>298</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_int_base = 8.84**

**SPECspeed®2017_int_peak = 9.07**

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

'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numacl i.e.:
numactl --interleave=all runcpu <etc>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory sync then drop_caches=3 to reset caches before invoking runcpu

dirty_ratio, swappiness, zone_reclaim_mode and drop_caches were all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)

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

**ASUSTeK Computer Inc.**

ASUS RS500A-E10(KRPA-U16) Server System
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**SPECspeed®2017_int_base = 8.84**

**SPECspeed®2017_int_peak = 9.07**

### CPU2017 License: 9016

Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Jan-2020

Hardware Availability: Feb-2020

Software Availability: Jun-2019

### Operating System Notes (Continued)

OS set to performance mode via cpupower frequency-set -g performance.

### Environment Variables Notes

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

- `GOMP_CPU_AFFINITY = "0-127"
- `LD_LIBRARY_PATH =
  - "/spec2017c1/amd_speed_aocc200_rome_C_lib/64;/spec2017c1/amd_speed_aocc200_rome_C_lib/32;"
- `MALLOC_CONF = "retain:true"
- `OMP_DYNAMIC = "false"
- `OMP_SCHEDULE = "static"
- `OMP_STACKSIZE = "128M"
- `OMP_THREAD_LIMIT = "128"

Environment variables set by runcpu during the 600.perlbench_s peak run:

- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 602.gcc_s peak run:

- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 605.mcf_s peak run:

- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 620.omnetpp_s peak run:

- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 623.xalancbmk_s peak run:

- `GOMP_CPU_AFFINITY = "0"
  - `OMP_STACKSIZE = "128M"

Environment variables set by runcpu during the 625.x264_s peak run:

- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 631.deepsjeng_s peak run:

- `GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 648.exchange2_s peak run:

- `GOMP_CPU_AFFINITY = "0"

### General Notes

Binaries were compiled on a system with 2x AMD EPYC 7601 CPU + 512GB Memory using Fedora 26

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)
SPEC CPU®2017 Integer Speed Result
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ASUSTeK Computer Inc.
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CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

General Notes (Continued)
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 v9.1.0 in Ubuntu 19.04 with -O3 -znver2 -flto
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 Configuration:
Power phase shedding = Disabled
SVM Mode = Disabled
SR-IOV support = Disabled
DRAM Scrub time = Disabled
NUMA nodes per socket = NPS4
Determinism Slider = Power

Sysinfo program /spec2017c1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on linux-wv9n Tue Jan  7 00:50:14 2020

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 7662 64-Core Processor
  1 "physical id"s (chips)
  128 "processors"
  cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
    cpu cores : 64
    siblings : 128
    physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
                 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
                 53 54 55 56 57 58 59 60 61 62 63

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 43 bits physical, 48 bits virtual

(Continued on next page)
Platform Notes (Continued)

CPU(s): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 2
Core(s) per socket: 64
Socket(s): 1
NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 23
Model: 49
Model name: AMD EPYC 7662 64-Core Processor
Stepping: 0
CPU MHz: 2000.000
CPU max MHz: 2000.0000
CPU min MHz: 1500.0000
BogoMIPS: 4039.89
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 16384K
NUMA node0 CPU(s): 0-15,64-79
NUMA node1 CPU(s): 16-31,80-95
NUMA node2 CPU(s): 32-47,96-111
NUMA node3 CPU(s): 48-63,112-127
Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl xtopology nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes avx f16c rdrand lahf_lm cmp_legacy cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibr s kinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_l2 mwaitx cpb cat_l3 cdp_l3 hw_pstate sme ssbd sev ibs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 cqm rdt_a rdseed adx smap clflushopt clwb sha_sha xsaveopt xsaves cqm_llc cqm_occupp_llc cqm_mbb_total cqm_mbb_local clzero irperf xsaveerptr arat npt lbv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists ptf threshold avic v_vmsave_vmload vgf umip rdpid overflow_recov succor smca

/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 4 5 6 7 8 9 10 11 12 13 14 15 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
node 0 size: 128825 MB
node 0 free: 128521 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 80 81 82 83 84 85 86 87 88

(Continued on next page)
**Platform Notes (Continued)**

89 90 91 92 93 94 95
node 1 size: 128981 MB
node 1 free: 128658 MB
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111
node 2 size: 129011 MB
node 2 free: 128840 MB
node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127
node 3 size: 128996 MB
node 3 free: 128830 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: 528194036 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From `/etc/*release*/` `/etc/*version*`
`os-release`:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"

`uname -a`:
Linux linux-wv9n 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB:
ASUSTeK Computer Inc.  
ASUS RS500A-E10(KRPA-U16) Server System  
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---

**SPEC CPU®2017 Integer Speed Result**

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---

### Platform Notes (Continued)

conditional, IBRS_FW, STIBP: conditional, RSB filling

---

run-level 3 Jan 6 10:48

**SPEC is set to:** /spec2017c1  
**Filesystem** | **Type** | **Size** | **Used** | **Avail** | **Use%** | **Mounted on**
--- | --- | --- | --- | --- | --- | ---
/dev/sdd4 | xfs | 199G | 14G | 186G | 7% | /

From /sys/devices/virtual/dmi/id  
**BIOS:** American Megatrends Inc. 0501 11/07/2019  
**Vendor:** ASUSTeK COMPUTER INC.  
**Product:** KRPA-U16 Series  
**Product Family:** Server  
**Serial:** System Serial Number

---

Additional information from dmidecode 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 Samsung M393A8G40AB2-CWE 64 kB 2 rank 3200
- 8x Unknown Unknown

---

### Compiler Version Notes

---

**C**

| 600.perlbench_s(base, peak) | 602.gcc_s(base, peak) | 605.mcf_s(base, peak) | 625.x264_s(base, peak) | 657.xz_s(base, peak) |
--- | --- | --- | --- | ---

---

**AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins**  
**AOCC_2_0_0-Build#191)** (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)  
**Target:** x86_64-unknown-linux-gnu  
**Thread model:** posix  
**InstalledDir:** /sppo/dev/compilers/aocc-compiler-2.0.0/bin

---

**C++**

| 623.xalancbmk_s(peak) |
--- |

---

**AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins**  
**AOCC_2_0_0-Build#191)** (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)  
**Target:** i386-unknown-linux-gnu  
**Thread model:** posix

---

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

<table>
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<th>C++</th>
<th>620.omnetpp_s(base, peak) 623.xalancbmk_s(base)</th>
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<th>Fortran</th>
<th>648.exchange2_s(base, peak)</th>
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
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Hardware Availability: Feb-2020
Test Sponsor: ASUSTeK Computer Inc.
Software Availability: Jun-2019

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Base Compiler Invocation

Base Portability Flags

Base Optimization Flags

C benchmarks:
-ffast-math
-march=znver2
-mllvm -unroll-threshold=50
-mllvm -function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
-DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-lljemalloc -lflang

C++ benchmarks:
-ffast-math
-march=znver2
-mllvm -unroll-threshold=200000
-mllvm -vector-library=LIBMVEC

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

C++ benchmarks (continued):
-mlllvm -unroll-threshold=100 -flv-function-specialization
-mlllvm -enable-partial-unswitch -z muldefs -DSPEC_OPENMP -fopenmp
-DSPEC_OPENMP -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-1jemalloc -lflang

Fortran benchmarks:
-flto -Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-region-vectorize -Wl,-mlllvm -Wl,-vector-library=LIBMVEC
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -ffast-math
-Wl,-mlllvm -Wl,-inline-recursion=4 -Wl,-mlllvm -Wl,-lsr-in-nested-loop
-Wl,-mlllvm -Wl,-enable-iv-split -O3 -march=znver2 -funroll-loops
-Mrecursive -mlllvm -vector-library=LIBMVEC -z muldefs
-mlllvm -disable-indvar-simplify -mlllvm -unroll-aggressive
-mlllvm -unroll-threshold=150 -DSPEC_OPENMP -fopenmp -DUSE_OPENMP
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -1jemalloc
-lflang

Base Other Flags

C benchmarks:
-Wno-return-type

C++ benchmarks:
-Wno-return-type

Fortran benchmarks:
-Wno-return-type

Peak Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang
## SPEC CPU®2017 Integer Speed Result

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**Hardware Availability:** Feb-2020  
**Tested by:** ASUSTeK Computer Inc.  
**Software Availability:** Jun-2019

---

### Peak Portability Flags

600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64  
602.gcc_s: -DSPEC_LP64  
605.mcf_s: -DSPEC_LP64  
620.omnetpp_s: -DSPEC_LP64  
623.xalancbmk_s: -DSPEC_LINUX -D_FILE_OFFSET_BITS=64  
625.x264_s: -DSPEC_LP64  
631.deepsjeng_s: -DSPEC_LP64  
641.leela_s: -DSPEC_LP64  
648.exchange2_s: -DSPEC_LP64  
657.xz_s: -DSPEC_LP64

### Peak Optimization Flags

**C benchmarks:**


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

602.gcc_s (continued):
-ffopenmp -DUSE_OPENMP -fgnu89-inline -ffopenmp=libomp
-llomp -lpthread -ldl -ljemalloc

605.mcf_s: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mlllvm -enable-gvno-hoist
-mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -vector-library=LIBMVEC
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -DSPEC_OPENMP -fopenmp
-llomp -lmvec -lamlilibm -fopenmp=libomp -llomp
-llthread -ldl -ljemalloc -llflang

625.x264_s: Same as 600.perlbench_s

657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_s: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -flv-function-specialization
-mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch
-mllvm -loop-unswitch-threshold=200000
-mllvm -vector-library=LIBMVEC
-mllvm -inline-threshold=1000 -DSPEC_OPENMP -fopenmp
-llomp -lmvec -lamlilibm -fopenmp=libomp -llomp
-llthread -ldl -ljemalloc -llflang

623.xalancbmk_s: -m32 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -flv-function-specialization
-mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch
-mllvm -loop-unswitch-threshold=200000

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

623.xalancbmk_s (continued):
-mlir -vector-library=LIBMVEC
-mlir -inline-threshold=1000 -DSPEC_OPENMP -fopenmp
-DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl
-lljemalloc

631.deepsjeng_s: Same as 620.omnetpp_s

641.leela_s: basepeak = yes

Fortran benchmarks:
-flto -Wl,-mlir -Wl,-function-specialize
-Wl,-mlir -Wl,-region-vectorize -Wl,-mlir -Wl,-vector-library=LIBMVEC
-Wl,-mlir -Wl,-reduce-array-computations=3 -ffast-math
-Wl,-mlir -Wl,-inline-recursion=4 -Wl,-mlir -Wl,-lsr-in-nested-loop
-Wl,-mlir -Wl,-enable-iv-split -O3 -march=znver2 -funroll-loops
-Mrecursive -mlir -vector-library=LIBMVEC
-mlir -disable-indvar-simplify -mlir -unroll-aggressive
-mlir -unroll-threshold=150 -DSPEC_OPENMP -fopenmp -DUSE_OPENMP
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc
-llflang

Peak Other Flags

C benchmarks:
-Wno-return-type

C++ benchmarks (except as noted below):
-Wno-return-type

623.xalancbmk_s: -Wno-return-type
-L/sppo/dev/cpu2017/v110/amd_speed_aocc200_rome_C_lib/32

Fortran benchmarks:
-Wno-return-type

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:
**SPEC CPU®2017 Integer Speed Result**

**ASUSTeK Computer Inc.**
ASUS RS500A-E10(KRPA-U16) Server System
2.00 GHz, AMD EPYC 7662

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
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<td>9.07</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9016  
**Test Sponsor:** ASUSTeK Computer Inc.  
**Tested by:** ASUSTeK Computer Inc.  

**Test Date:** Jan-2020  
**Hardware Availability:** Feb-2020  
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