# SPEC CPU®2017 Integer Speed Result

**ASUSTeK Computer Inc.**

ASUS ESC4000A-E10(KRPG-U8) Server System
2.60 GHz, AMD EPYC 7H12

| Threads | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|---------|---|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 600.perlbench_s | | | | | | | | | | | | | | | | | | | | | | | |
| 602.gcc_s | 64 | 1 | | | | | | | | | | | | | | 4.82 | 5.08 | | | | | |
| 605.mcf_s | 64 | 1 | | | | | | | | | | | | | | 5.08 | 5.11 | | | | | |
| 620.omnetpp_s | 64 | 1 | | | | | | | | | | | | | | 9.36 | 9.77 | | | | | |
| 623.xalancbmk_s | 64 | 1 | | | | | | | | | | | | | | 15.2 | 16.2 | | | | | |
| 625.x264_s | 64 | 1 | | | | | | | | | | | | | | 10.1 | 12.5 | | | | | |
| 631.deepsjeng_s | 64 | 1 | | | | | | | | | | | | | | 4.87 | 4.96 | | | | | |
| 641.leela_s | 64 | 1 | | | | | | | | | | | | | | 4.22 | 4.96 | | | | | |
| 648.exchange2_s | 64 | 1 | | | | | | | | | | | | | | 16.5 | 20.9 | | | | | |
| 657.xz_s | 64 | 1 | | | | | | | | | | | | | | 20.9 | 20.9 | | | | | |

---

**Hardware**

- **CPU Name:** AMD EPYC 7H12
- **Max MHz:** 3300
- **Nominal:** 2600
- **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 480 GB SATA SSD
- **Other:** None

**Software**

- **OS:** Ubuntu 19.04 (x86_64)
- **Kernel:** 5.0.0-20-generic
- **Compiler:** C/C++/Fortran: Version 2.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Version 0301 released May-2020
- **File System:** ext4
- **System State:** Run level 5 (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.

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**SPECspeed®2017_int_base = 8.87**

**SPECspeed®2017_int_peak = 9.09**
ASUSTeK Computer Inc.  
ASUS ESC4000A-E10(KRPG-U8) Server System  
2.60 GHz, AMD EPYC 7H12

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>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>64</td>
<td>368</td>
<td>4.82</td>
<td>375</td>
<td>4.74</td>
<td>368</td>
<td>4.83</td>
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<td>602.gcc_s</td>
<td>64</td>
<td>406</td>
<td>9.81</td>
<td>410</td>
<td>9.72</td>
<td>409</td>
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<td>64</td>
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<td>625.x264_s</td>
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<td>12.5</td>
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<td>631.deepsjeng_s</td>
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<td>4.87</td>
<td>295</td>
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<td>648.exchange2_s</td>
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<td>296</td>
<td>20.9</td>
<td>64</td>
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</table>

SPECspeed\textsuperscript{2017\_int\_base} = 8.87  
SPECspeed\textsuperscript{2017\_int\_peak} = 9.09

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-aoccc/

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 numactl 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)
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| SPECspeed®2017_int_base = 8.87 |
| SPECspeed®2017_int_peak = 9.09 |

**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 657.xz_s peak run:

- `GOMP_CPU_AFFINITY = "0-63"

**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)
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SPECspeed®2017_int_base = 8.87
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CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.
Test Date: Jun-2020
Hardware Availability: Jul-2020
Software Availability: Jun-2019

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
APBDIS = 1
cTDP = 280

Sysinfo program /spec2017c1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed986ea46a485a0011
running on daytona-135 Tue Jun 2 16:09:27 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 7H12 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

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**SPECspeed®2017_int_peak = 9.09**

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

<table>
<thead>
<tr>
<th>CPU(s):</th>
<th>128</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-line CPU(s) list:</td>
<td>0-127</td>
</tr>
<tr>
<td>Thread(s) per core:</td>
<td>2</td>
</tr>
<tr>
<td>Core(s) per socket:</td>
<td>64</td>
</tr>
<tr>
<td>Socket(s):</td>
<td>1</td>
</tr>
<tr>
<td>NUMA node(s):</td>
<td>4</td>
</tr>
<tr>
<td>Vendor ID:</td>
<td>AuthenticAMD</td>
</tr>
<tr>
<td>CPU family:</td>
<td>23</td>
</tr>
<tr>
<td>Model:</td>
<td>49</td>
</tr>
<tr>
<td>Model name:</td>
<td>AMD EPYC 7H12 64-Core Processor</td>
</tr>
<tr>
<td>Stepping:</td>
<td>0</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>1647.013</td>
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<tr>
<td>CPU max MHz:</td>
<td>2600.0000</td>
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<tr>
<td>CPU min MHz:</td>
<td>1500.0000</td>
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<tr>
<td>BogoMIPS:</td>
<td>5252.10</td>
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<tr>
<td>Virtualization:</td>
<td>AMD-V</td>
</tr>
<tr>
<td>L1d cache:</td>
<td>32K</td>
</tr>
<tr>
<td>L1i cache:</td>
<td>32K</td>
</tr>
<tr>
<td>L2 cache:</td>
<td>512K</td>
</tr>
<tr>
<td>L3 cache:</td>
<td>16384K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-15,64-79</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>16-31,80-95</td>
</tr>
<tr>
<td>NUMA node2 CPU(s):</td>
<td>32-47,96-111</td>
</tr>
<tr>
<td>NUMA node3 CPU(s):</td>
<td>48-63,112-127</td>
</tr>
<tr>
<td>Flags:</td>
<td>fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge 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 osfw ibs skinit wdt tce topoext perfctr_core perfctr_nb bptext perfctr_l1d mwaitx cpb cat_l3 cdp_l3 hw_pstate sme ssbd mba sev ibrs ibpb stibp vmmcall fsmsrbase bmi1 avx2 smep bmi2 cqm rdt_a rdseed advx smap clflushopt clwb sha ni xsaveopt xsave cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local clzero irperf xsaves cpu��{:m} atm npt lbrv svm lock nrip save tsc scale vmcb_clean flushbyasid decodeassist psf pfthreshold avic v_vmcs_save vmload vgif umip rpdp overflow_recov succor smca</td>
</tr>
</tbody>
</table>

/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

(Continued on next page)
<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 size: 128890 MB</td>
</tr>
<tr>
<td>node 0 free: 128073 MB</td>
</tr>
<tr>
<td>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 89 90 91 92 93 94 95</td>
</tr>
<tr>
<td>node 1 size: 129015 MB</td>
</tr>
<tr>
<td>node 1 free: 128633 MB</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>node 2 size: 128992 MB</td>
</tr>
<tr>
<td>node 2 free: 128628 MB</td>
</tr>
<tr>
<td>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</td>
</tr>
<tr>
<td>node 3 size: 129003 MB</td>
</tr>
<tr>
<td>node 3 free: 128662 MB</td>
</tr>
<tr>
<td>node distances:</td>
</tr>
<tr>
<td>node 0 1 2 3</td>
</tr>
<tr>
<td>0: 10 12 12 12</td>
</tr>
<tr>
<td>1: 12 10 12 12</td>
</tr>
<tr>
<td>2: 12 12 10 12</td>
</tr>
<tr>
<td>3: 12 12 12 10</td>
</tr>
</tbody>
</table>

From /proc/meminfo
MemTotal: 528284096 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
debian_version: buster/sid
os-release:
  NAME="Ubuntu"
  VERSION="19.04 (Disco Dingo)"
  ID=ubuntu
  ID_LIKE=debian
  PRETTY_NAME="Ubuntu 19.04"
  VERSION_ID="19.04"
  HOME_URL="https://www.ubuntu.com/
  SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
Linux daytona-135 5.0.0-20-generic #21-Ubuntu SMP Mon Jun 24 09:32:09 UTC 2019 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
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CPU2017 License: 9016
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Tested by: ASUSTeK Computer Inc.

Platform Notes (Continued)

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 retropine, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling

run-level 5 Jun 2 09:12
SPEC is set to: /spec2017c1

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 439G 49G 369G 12% /

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. 0301 05/26/2020
Vendor: ASUSTeK COMPUTER INC.
Product: KRPG-U8 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

(End of data from sysinfo program)

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

(Continued on next page)
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<th>CPU2017 License</th>
<th>Test Sponsor</th>
<th>Hardware Availability</th>
<th>Test Date</th>
<th>Software Availability</th>
</tr>
</thead>
</table>

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### Compiler Version Notes (Continued)

```
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
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
```

C++  | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base) 631.deepsjeng_s(base, peak) 641.leela_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
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
```

C++  | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)

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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
```

Fortran  | 648.exchange2_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
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CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Test Date: Jun-2020
Tested by: ASUSTeK Computer Inc.
Hardware Availability: Jul-2020
Software Availability: Jun-2019

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Base 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 -DSPEC_LP64
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

Base Optimization Flags

C benchmarks:
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver2 -fstruct-layout=3 -mllvm -unroll-threshold=50
-fremap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-flv-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
-DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-ljemalloc -lflang

C++ benchmarks:
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2
-mllvm -loop-unswitch-threshold=200000 -mllvm -vector-library=LIBMVEC

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

ASUSTeK Computer Inc.
ASUS ESC4000A-E10(KRPG-U8) Server System
2.60 GHz, AMD EPYC 7H12

| SPECspeed®2017_int_base = 8.87 |
| SPECspeed®2017_int_peak = 9.09 |

**CPU2017 License:** 9016  
**Test Date:** Jun-2020  
**Test Sponsor:** ASUSTeK Computer Inc.  
**Tested by:** ASUSTeK Computer Inc.  

**Hardware Availability:** Jul-2020  
**Software Availability:** Jun-2019

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### Base Optimization Flags (Continued)

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

Fortran benchmarks:
- `f77 -Wl,-mllvm -Wl,-function-specialize`
- `-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC`
- `-Wl,-mllvm -Wl,-reduce-array-computations=3 -ffast-math`
- `-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop`
- `-Wl,-mllvm -Wl,-enable-iv-split -O3 -march=x86-64 -funroll-loops`
- `-Mrecursive -mllvm -vector-library=LIBMVEC -z muldefs`
- `-mllvm -disable-indvar-simplify -mllvm -unroll-aggressive`
- `-mllvm -unroll-threshold=150 -DSPEC_OPENMP -fopenmp -DUSE_OPENMP`
- `-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc`
- `-lflang`

### Base Other Flags

C benchmarks:
- `-Wno-return-type`

C++ benchmarks:
- `-Wno-return-type`

Fortran benchmarks:
- `-Wno-return-type`

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### Peak Compiler Invocation

C benchmarks:
- `clang`

C++ benchmarks:
- `clang++`

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

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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:

600.perlbench_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
-fprofile-instr-generate(pass 1)
-fprofile-instr-use(pass 2) -Ofast -march=znver2
-mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-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
-DUSE_OPENMP -lmvec -lamlibm -fopenmp=libomp -lopmp
-lpthread -ldl -ljemalloc -lflang

602.gcc_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 -mllvm -enable-gvn-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 -z muldefs -DSPEC_OPENMP

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Peak Optimization Flags (Continued)

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

605.mcf_s: -fflto -Wl,-mlcvm -Wl,-function-specialize
-Wl,-mlcvm -Wl,-region-vectorize
-Wl,-mlcvm -Wl,-vector-library=LIBMVEC
-Wl,-mlcvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mlcvm -vectorize-memory-aggressively
-mlcvm -function-specialize -mlcvm -enable-gvn-hoist
-mlcvm -unroll-threshold=50 -fremap-arrays
-mlcvm -vector-library=LIBMVEC
-mlcvm -reduce-array-computations=3
-mlcvm -global-vectorize-slp -mlcvm -inline-threshold=1000
-flv-function-specialization -DSPEC_OPENMP -ffopenmp
-DUSE_OPENMP -lmvec -lamdlibm -ffopenmp=libomp -lomp
-lpthread -ldl -ljemalloc -llflang

625.x264_s: Same as 600.perlbench_s

657.xz_s: -fflto -Wl,-mlcvm -Wl,-function-specialize
-Wl,-mlcvm -Wl,-region-vectorize
-Wl,-mlcvm -Wl,-vector-library=LIBMVEC
-Wl,-mlcvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mlcvm -vectorize-memory-aggressively
-mlcvm -function-specialize -mlcvm -enable-gvn-hoist
-mlcvm -unroll-threshold=50 -fremap-arrays
-mlcvm -vector-library=LIBMVEC
-mlcvm -reduce-array-computations=3
-mlcvm -global-vectorize-slp -mlcvm -inline-threshold=1000
-flv-function-specialization -DSPEC_OPENMP -ffopenmp
-DUSE_OPENMP -ffopenmp=libomp -lomp -lpthread -ldl
-lmvec -lamdlibm -ljemalloc -llflang

C++ benchmarks:

620.omnetpp_s: -fflto -Wl,-mlcvm -Wl,-function-specialize
-Wl,-mlcvm -Wl,-region-vectorize
-Wl,-mlcvm -Wl,-vector-library=LIBMVEC
-Wl,-mlcvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -flv-function-specialization
-mlcvm -unroll-threshold=100
-mlcvm -enable-partial-unswitch
-mlcvm -loop-unswitch-threshold=200000

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

**ASUSTeK Computer Inc.**  
ASUS ESC4000A-E10(KRPG-U8) Server System  
2.60 GHz, AMD EPYC 7H12

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>8.87</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
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</tbody>
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- **CPU2017 License:** 9016  
- **Test Sponsor:** ASUSTeK Computer Inc.  
- **Tested by:** ASUSTeK Computer Inc.  
- **Test Date:** Jun-2020  
- **Hardware Availability:** Jul-2020  
- **Software Availability:** Jun-2019

### Peak Optimization Flags (Continued)

620.omnetpp_s (continued):
- `mllvm -vector-library=LIBMVEC`  
- `mllvm -inline-threshold=1000 -DSPEC_OPENMP -fopenmp`  
- `DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl`  
- `lmvec -lamdlibm -ljemalloc -lflang`

623.xalancbmk_s: `-m32 -fllto -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`  
- `-DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl`  
- `-ljemalloc`

631.deepsjeng_s: Same as 620.omnetpp_s

641.leela_s: basepeak = yes

Fortran benchmarks:

648.exchange2_s: basepeak = yes

### 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`
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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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