## SPEC CPU®2017 Floating Point Speed Result

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**ASUSteK Computer Inc.**  
ASUS RS520A-E11(KMPA-U16) Server System  
2.00 GHz, AMD EPYC 7663  

**CPU2017 License:** 9016  
**Test Date:** Jun-2021  
**Test Sponsor:** ASUSteK Computer Inc.  
**Hardware Availability:** May-2021  
**Tested by:** ASUSteK Computer Inc.  
**Software Availability:** Mar-2021

### Threads

<table>
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<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tr>
<td>603.bwaves_s</td>
<td>56</td>
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<td>161</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>56</td>
<td>256</td>
<td>364</td>
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<tr>
<td>619.lbm_s</td>
<td>56</td>
<td>73.8</td>
<td>75.5</td>
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<tr>
<td>621.wrf_s</td>
<td>56</td>
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<tr>
<td>627.cam4_s</td>
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<tr>
<td>628.pop2_s</td>
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<td>74.7</td>
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<tr>
<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
<td>56</td>
<td>112</td>
<td>395</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>56</td>
<td>76.1</td>
<td>178</td>
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<tr>
<td>654.roms_s</td>
<td>56</td>
<td>185</td>
<td>185</td>
</tr>
</tbody>
</table>

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### Hardware

**CPU Name:** AMD EPYC 7663  
**Max MHz:** 3500  
**Nominal:** 2000  
**Enabled:** 56 cores, 1 chip, 2 threads/core  
**Orderable:** 1 chip  
**Cache L1:** 32 KB I + 32 KB D on chip per core  
**Cache L2:** 512 KB I+D on chip per core  
**Cache L3:** 256 MB I+D on chip per chip, 32 MB shared / 7 cores  
**Other:** None  
**Memory:** 512 GB (8 x 64 GB 4Rx4 PC4-3200AA-L)  
**Storage:** 1 x 240 GB SATA SSD  
**Other:** None

---

### Software

**OS:** SUSE Linux Enterprise Server 15 SP2 (x86_64)  
**Kernel:** 5.3.18-22-default  
**Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC  
**Parallel:** Yes  
**Firmware:** Version 0401 released Apr-2021  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** 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.
ASUSTeK Computer Inc.
ASUS RS520A-E11(KMPA-U16) Server System
2.00 GHz, AMD EPYC 7663

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

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Threads</th>
<th>Seconds</th>
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<td>112</td>
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</tr>
</tbody>
</table>

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
OS set to performance mode via cpupower frequency-set -g performance
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory and avoid remote memory usage.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout randomization (ASLR) to reduce run-to-run variability.
To enable Transparent Hugepages (THP) for all allocations,
Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To enable THP only on request for peak runs of 628.pop2_s, and 638.imagick_s,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To disable THP for peak runs of 627.cam4_s, 644.nab_s, 649.fotonik3d_s, and 654.roms_s,
'echo never > /sys/kernel/mm/transparent_hugepage/enabled' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-111"
LD_LIBRARY_PATH =
   "/cpu118/amd_speed_aocc300_milan_B_lib/64;/cpu118/amd_speed_aocc300_milan_B_lib/32:"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "112"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0 56 1 57 2 58 3 59 4 60 5 61 6 62 7 63 8 64 9 65 10 66
 11 67 12 68 13 69 14 70 15 71 16 72 17 73 18 74 19 75 20 76 21 77 22 78
 23 79 24 80 25 81 26 82 27 83 28 84 29 85 30 86 31 87 32 88 33 89 34 90
 35 91 36 92 37 93 38 94 39 95 40 96 41 97 42 98 43 99 44 100 45 101 46
 102 47 103 48 104 49 105 50 106 51 107 52 108 53 109 54 110 55 111"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-55"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 56 1 57 2 58 3 59 4 60 5 61 6 62 7 63 8 64 9 65 10 66
 11 67 12 68 13 69 14 70 15 71 16 72 17 73 18 74 19 75 20 76 21 77 22 78
 23 79 24 80 25 81 26 82 27 83 28 84 29 85 30 86 31 87 32 88 33 89 34 90
 35 91 36 92 37 93 38 94 39 95 40 96 41 97 42 98 43 99 44 100 45 101 46
 102 47 103 48 104 49 105 50 106 51 107 52 108 53 109 54 110 55 111"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-55"

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)
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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 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 Configuration:
DLWM Support = Disabled
SVM Mode = Disabled
NUMA nodes per socket = NPS2
APBDIS = 1
Fix SOC P-state = P0
Engine Boost = Enabled
IOMMU = Disabled

Sysinfo program /cpul18/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost Thu Jun 24 08:13:07 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 7663 56-Core Processor
  1 "physical id"s (chips)
  112 "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 : 56
siblings : 112
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30 32 33 34 35 36 37 38 40 41 42 43 44 45 46 48 49 50 51 52 53 54 56 57 58 59 60 61 62
From lscpu from util-linux 2.33.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian

(Continued on next page)
platform notes (continued)

address sizes: 48 bits physical, 48 bits virtual
CPU(s): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 2
Core(s) per socket: 56
Socket(s): 1
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7663 56-Core Processor
Stepping: 1
CPU MHz: 2762.793
CPU max MHz: 2000.0000
CPU min MHz: 1500.0000
BogoMIPS: 3992.74
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 32768K
NUMA node0 CPU(s): 0-27, 56-83
NUMA node1 CPU(s): 28-55, 84-111
Flags: 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 nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq
monitor ssse3 fma cx16 pcid sse4_1 sse4_2 movbe popcnt aes avx f16c rdrand
lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw
ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb
cat_13 cdp_13 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsiqbase
bmi1 avx2 smep bmi2  64b invpcid cmov rdt_a rdseed adx smap clflushopt clwb sha
xsavector xsaveopt xsavec xgetbv1 xsavec cmq_llc cmq_occure_llc cmq_mbm_total cmq_mbm
local clzero irperf xsaveerptr wbinvd arat npt lbrv svm_lock nrip_save tsc_scale
vmcb_clean flushbyasid decodeaissists pauselimit pfthreshold v_vmsave_vmload vgif
umip pku ospke vaes vpclmulqdq rdpid overflow_recover succor smca

/proc/cpuinfo cache data
cache size: 512 KB

From numactl --hardware
WARNING: a numaclt 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
node 0 cpus: 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
56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83
node 0 size: 257845 MB
node 0 free: 257073 MB
node 1 cpus: 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
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SPECspeed®2017_fp_base = 161
SPECspeed®2017_fp_peak = 164

Platform Notes (Continued)

53 54 55 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106
107 108 109 110 111
node 1 size: 257985 MB
node 1 free: 257340 MB
node distances:
node 0 1
0: 10 12
1: 12 10

From /proc/meminfo
MemTotal: 528211372 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release* /etc/*version*
os-release:
NAME="SLES"
VERSION="15-SP2"
VERSION_ID="15.2"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp2"

uname -a:
Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) 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):
Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass):
Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1):
Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling
CVE-2017-5715 (Spectre variant 2):

(Continued on next page)
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Platform Notes (Continued)
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jun 24 08:12
SPEC is set to: /cpu118
Filesystem   Type  Size  Used  Avail  Use% Mounted on
/dev/sda4    xfs    199G  25G  175G   13%  /

From /sys/devices/virtual/dmi/id
Vendor: ASUSTeK COMPUTER INC.
Product: RS520A-E11-RS24U
Product Family: Server
Serial: 333366669999

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 Samsung M386A8K40DM2-CWE 64 GB 4 rank 3200
  8x Unknown Unknown

BIOS:
  BIOS Vendor: American Megatrends Inc.
  BIOS Version: 0401
  BIOS Date: 04/14/2021
  BIOS Revision: 4.1

(End of data from sysinfo program)

Compiler Version Notes
==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(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

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)

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

```
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)
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)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(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, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
| 628.pop2_s(base, peak)
------------------------------------------------------------------------------
```

Compiler Version Notes (Continued)
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Base Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using Fortran, C, and C++:
clang++ clang flang

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswap -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswap -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallback-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Os -march=znver3
-fvcclib=AMDLIBM -ffast-math -flto -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-lcm-vrp -mllvm -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching

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2.00 GHz, AMD EPYC 7663

spec

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SPECspeed®2017_fp_base = 161
SPECspeed®2017_fp_peak = 164

ASUSTeK Computer Inc.

CPU2017 License: 9016
Test Date: Jun-2021
Tested by: ASUSTeK Computer Inc.

Fortran benchmarks (continued):
-Wl,-mlllvm -Wl,-enable-licm-vrp -Wl,-mlllvm -Wl,-region-vectorize
-Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -Hz,1,0xl -O3
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mlllvm -fuse-tile-inner-loop -funroll-loops
-mlllvm -extra-vectorizer-passes -mlllvm -lsr-in-nested-loop
-mlllvm -enable-licm-vrp -mlllvm -reduce-array-computations=3
-mlllvm -global-vectorize-slp=true -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti

Benchmarks using both Fortran and C:
-m64 -mno-adx -mno-sse4a -Wl,-mlllvm -Wl,-enable-X86-prefetching
-Wl,-mlllvm -Wl,-enable-licm-vrp -Wl,-mlllvm -Wl,-region-vectorize
-Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000
-fremap-arrays -mlllvm -function-specialize -flv-function-specialization
-mlllvm -enable-gvn-hoist -mlllvm -global-vectorize-slp=true
-mlllvm -enable-licm-vrp -mlllvm -reduce-array-computations=3 -Hz,1,0xl
-Mrecursive -mlllvm -fuse-tile-inner-loop -funroll-loops
-mlllvm -extra-vectorizer-passes -mlllvm -lsr-in-nested-loop -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

Benchmarks using Fortran, C, and C++:
-m64 -mno-adx -mno-sse4a -std=c++98
-Wl,-mlllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mlllvm -Wl,-region-vectorize -Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000
-fremap-arrays -mlllvm -function-specialize -flv-function-specialization
-mlllvm -enable-gvn-hoist -mlllvm -global-vectorize-slp=true
-mlllvm -enable-licm-vrp -mlllvm -reduce-array-computations=3
-mlllvm -enable-partial-unsswitch -mlllvm -unroll-threshold=100
-finline-aggressive -mlllvm -loop-unsswitch-threshold=200000
-mlllvm -reroll-loops -mlllvm -aggressive-loop-unsswitch
-mlllvm -extra-vectorizer-passes -mlllvm -convert-pow-exp-to-int=false
-Hz,1,0xl -Mrecursive -mlllvm -fuse-tile-inner-loop -funroll-loops
-mlllvm -lsr-in-nested-loop -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti
ASUSTeK Computer Inc.  
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Hardware Availability: May-2021  
Tested by: ASUSTeK Computer Inc.  
Software Availability: Mar-2021

Base Other Flags

C benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

Fortran benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

Benchmarks using both Fortran and C:
-Wno-unused-command-line-argument -Wno-return-type

Benchmarks using Fortran, C, and C++:
-Wno-unused-command-line-argument -Wno-return-type

Peak Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using Fortran, C, and C++:
clang++ clang flang

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: -m64 -mno-adx -mno-sse4a  
-Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast  
-march=znver3 -fveclib=AMDLIBM -ffast-math -f1to  
-fstruct-layout=5 -mllvm -unroll-threshold=50

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ASUSTeK Computer Inc.

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Peak Optimization Flags (Continued)

619.lbm_s (continued):
- freemap-arrays -flv-function-specialization
- mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
- mllvm -global-vectorize-slp=true
- mllvm -function-specialize -mllvm -enable-lcim-vrp
- mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
  -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

638.imagick_s: basepeak = yes

644.nab_s: -m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-region-vectorize
- Wl, -mllvm -Wl,-function-specialize -Ofast -march=znver3
- fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
- mllvm -unroll-threshold=50 -fremap-arrays
- flv-function-specialization -mllvm -inline-threshold=1000
- mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
- mllvm -function-specialize -mllvm -enable-lcim-vrp
- mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
  -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Fortran benchmarks:

603.bwaves_s: basepeak = yes

649.fotonik3d_s: basepeak = yes

654.roms_s: -m64 -mno-adx -mno-sse4a
- Wl, -mllvm -Wl,-enable-X86-prefetching
- Wl, -mllvm -Wl,-enable-lcim-vrp
- Wl, -mllvm -Wl,-function-specialize
- Wl, -mllvm -Wl,-align-all-nofallthru-blocks=6
- Wl, -mllvm -Wl,-reduce-array-computations=3 -Ofast
- march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
- mllvm -reduce-array-computations=3
- mllvm -global-vectorize-slp=true -mllvm -enable-lcim-vrp
- DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
  -ljemalloc -lflang

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -mno-adx -mno-sse4a
- Wl, -mllvm -Wl,-enable-X86-prefetching
- Wl, -mllvm -Wl,-enable-lcim-vrp
- Wl, -mllvm -Wl,-function-specialize
- Wl, -mllvm -Wl,-align-all-nofallthru-blocks=6
- Wl, -mllvm -Wl,-reduce-array-computations=3 -Ofast

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SPECspeed®2017_fp_base = 161
SPECspeed®2017_fp_peak = 164

Peak Optimization Flags (Continued)

621.wrf_s (continued):
- march=znver3 -fveclib=AMDLIBM -ffast-math -flto
- fstructure=5 -mllvm -unroll-threshold=50
- fremap-arrays -flv-function-specialization
- mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
- mllvm -global-vectorize-slp=true
- mllvm -function-specialize -mllvm -enable-lcm-vrp
- mllvm -reduce-array-computations=3 -Hz,1,0x1 -03
- mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
- mllvm -extra-vectorize-passes -mllvm -lsr-in-nested-loop
- DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
- ljemalloc -lflang

627.cam4_s: basepeak = yes
628.pop2_s: basepeak = yes
Benchmarks using Fortran, C, and C++:
607.cactuBSSN_s: basepeak = yes

Peak Other Flags

C benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

Fortran benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

Benchmarks using both Fortran and C:
-Wno-unused-command-line-argument -Wno-return-type

Benchmarks using Fortran, C, and C++:
-Wno-unused-command-line-argument -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:
http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-AMD-Milan-V1.3.2021-07-06.xml
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