ASUSTeK Computer Inc.

ASUS RS520A-E11(KMPA-U16) Server System
2.95 GHz, AMD EPYC 75F3

**SPECspeed®2017_fp_base = 160**
**SPECspeed®2017_fp_peak = 165**

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>250</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>74.8</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>206</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>92.6</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>117</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>190</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>270</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td>76.3</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>167</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>187</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** AMD EPYC 75F3
- **Max MHz:** 4000
- **Nominal:** 2950
- **Enabled:** 32 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, 32 MB shared / 4 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)
- **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.
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CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.
Test Date: Jun-2021
Hardware Availability: May-2021
Software Availability: Mar-2021

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>147</td>
<td>400</td>
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<td>607.cactuBSSN_s</td>
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<td>66.5</td>
<td>251</td>
<td>66.7</td>
<td>250</td>
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<td>619.lbm_s</td>
<td>32</td>
<td>70.1</td>
<td>74.7</td>
<td>69.7</td>
<td>75.1</td>
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<td>621.wrf_s</td>
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<td>64.2</td>
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<td>64.2</td>
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<tr>
<td>627.cam4_s</td>
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<td>76.3</td>
<td>116</td>
<td>76.1</td>
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<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>129</td>
<td>92.2</td>
<td>128</td>
<td>92.6</td>
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<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>75.4</td>
<td>191</td>
<td>76.1</td>
<td>190</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>64.6</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>126</td>
<td>72.1</td>
<td>119</td>
<td>76.3</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>94.4</td>
<td>167</td>
<td>94.7</td>
<td>166</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 160
SPECspeed®2017_fp_peak = 165

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,

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

'echo always > /sys/kernel/mm/transient_hugepage/enabled' and
'echo always > /sys/kernel/mm/transient_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/transient_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/transient_hugepage/enabled' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-63"
LD_LIBRARY_PATH =
"/cpu118/amd_speed_aocc300_milan_B_lib/64;/cpu118/amd_speed_aocc300_milan_B_lib/32;"
MALLOCONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "64"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42
11 43 12 44 13 45 14 46 15 47 16 48 17 49 18 50 19 51 20 52 21 53 22 54
23 55 24 56 25 57 26 58 27 59 28 60 61 62 63"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42
11 43 12 44 13 45 14 46 15 47 16 48 17 49 18 50 19 51 20 52 21 53 22 54
23 55 24 56 25 57 26 58 27 59 28 60 61 62 63"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-31"

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)
SPEC CPU®2017 Floating Point Speed Result

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ASUS RS520A-E11(KMPA-U16) Server System
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Test Date: Jun-2021
Hardware Availability: May-2021
Tested by: ASUSTeK Computer Inc.
Software Availability: Mar-2021

General Notes (Continued)

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 /cpu118/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafe64d
running on localhost Thu Jun 24 16:05:37 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 75F3 32-Core Processor
  1 "physical id"s (chips)
    64 "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 : 32
    siblings : 64
    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

From lscpu from util-linux 2.33.1:
  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): 64
  On-line CPU(s) list: 0-63
  Thread(s) per core: 2
  Core(s) per socket: 32

(Continued on next page)
ASUSTeK Computer Inc.
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SPECspeed®2017_fp_base = 160
SPECspeed®2017_fp_peak = 165

Platform Notes (Continued)

Socket(s): 1
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 75F3 32-Core Processor
Stepping: 1
CPU MHz: 1789.950
CPU max MHz: 2950.0000
CPU min MHz: 1500.0000
BogoMIPS: 5888.55
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 32768K
NUMA node0 CPU(s): 0-15,32-47
NUMA node1 CPU(s): 16-31,48-63
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 rdtsscp 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 3nowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpxext perfctr_l1c mwaitx cpb cat_13 cd_p_13 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmcall fsgsbase bm1 avx2 smep bml2 erms invpcid cmq rdt_a rbseed adx smap clflushopt clwb sha_ni xsavesopt xsavexc xgetbv1 xsaves cmq_l1c cmq_occup_l1c cmq_mbm_total cmq_mbm_local clzero irperf xsaveerptr wboinvd arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist pausefilter pfthreshold v_vm-save_vmload vgif umip pku ospke vae vpclmulqdq 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: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
node 0 size: 257817 MB
node 0 free: 257344 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
node 1 size: 258025 MB
node 1 free: 257416 MB
node distances:
node 0 1

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Specspeed 2017_fp_peak = 165
Specspeed 2017_fp_base = 160

Platform Notes (Continued)

0: 10 12
1: 12 10

From /proc/meminfo
   MemTotal:       528222656 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 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/swaps barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Full AMD retpoline, IBFB: conditional, IBRS_FW, STIBF: always-on, RSB filling
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jun 24 16:05
SPEC is set to: /cpu118

(Continued on next page)
SPEC CPU® 2017 Floating Point Speed Result

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Platform Notes (Continued)

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)
-----------------------------------------------
AMDClang 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)
-----------------------------------------------
AMDClang 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

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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

Fortran, C

C benchmarks:
clang

Fortran benchmarks:
flang

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Base Compiler Invocation (Continued)

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 -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -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-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=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 -llflangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-lcm-vrp -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 -Hz,1,0x1 -O3

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SPEC CPU®2017 Floating Point Speed Result

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Base Optimization Flags (Continued):

Fortran benchmarks (continued):
- -march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
- -mllvm -fuse-tile-inner-loop -funroll-loops
- -mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
- -mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
- -mllvm -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,-mllvm -Wl,-enable-X86-prefetching
- -Wl,-mllvm -Wl,-enable-licm-vrp -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 -march=znver3
- -fveclib=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-licm-vrp -mllvm -reduce-array-computations=3 -Hz,1,0x1
- -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
- -mllvm -extra-vectorizer-passes -mllvm -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,-mllvm -Wl,-x86-use-vzeroupper=false
- -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 -march=znver3
- -fveclib=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-licm-vrp -mllvm -reduce-array-computations=3
- -mllvm -enable-partial-unswitch -mllvm -unroll-threshold=100
- -finline-aggressive -mllvm -loop-unswitch-threshold=200000
- -mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
- -mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false
- -Hz,1,0x1 -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
- -mllvm -lsr-in-nested-loop -z muldefs -DSPEC_OPENMP -fopenmp
- -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti
SPEC CPU®2017 Floating Point Speed Result

ASUSTeK Computer Inc.
ASUS RS520A-E11(KMPA-U16) Server System
2.95 GHz, AMD EPYC 75F3

SPECSpeed®2017_fp_base = 160
SPECSpeed®2017_fp_peak = 165

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Test Date: Jun-2021
Tested by: ASUSTeK Computer Inc.
Hardware Availability: May-2021
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 -flto
-fstruct-layout=5 -mllvm -unroll-threshold=50

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

619.lbm_s (continued):
-fremap-arrays -flv-function-specialization
-mlirv -inline-threshold=1000 -mlirv -enable-gvn-hoist
-mlirv -global-vectorize-slp=true
-mlirv -function-specialize -mlirv -enable-licm-vrp
-mlirv -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,-mlirv -Wl,-region-vectorize
-Wl,-mlirv -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mlirv -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mlirv -inline-threshold=1000
-mlirv -enable-gvn-hoist -mlirv -global-vectorize-slp=true
-mlirv -function-specialize -mlirv -enable-licm-vrp
-mlirv -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,-mlirv -Wl,-enable-X86-prefetching
-Wl,-mlirv -Wl,-enable-licm-vrp
-Wl,-mlirv -Wl,-function-specialize
-Wl,-mlirv -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirv -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mlirv -reduce-array-computations=3
-mlirv -global-vectorize-slp=true -mlirv -enable-licm-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,-mlirv -Wl,-enable-X86-prefetching
-Wl,-mlirv -Wl,-enable-licm-vrp
-Wl,-mlirv -Wl,-function-specialize
-Wl,-mlirv -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirv -Wl,-reduce-array-computations=3 -Ofast

(Continued on next page)
SPECSpeed®2017_fp_base = 160
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Peak Optimization Flags (Continued)

621.wrf_s (continued):
- 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-licm-vrp
- mllvm -reduce-array-computations=3 -Hz,1,0x1 -O3
- Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
- mllvm -extra-vectorizer-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
ASUSTeK Computer Inc.
ASUS RS520A-E11(KMPA-U16) Server System
2.95 GHz, AMD EPYC 75F3

| SPECspeed\(^\text{2017}_\text{fp}_{\text{base}}\) = 160 |
|-----------------|-----------------|
| SPECspeed\(^\text{2017}_\text{fp}_{\text{peak}}\) = 165 |

**SPEC CPU**\(^\text{2017}\) Floating Point Speed Result

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