



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.00 GHz, AMD EPYC 7663

SPECspeed®2017_fp_base = 240

SPECspeed®2017_fp_peak = 247

CPU2017 License: 9016

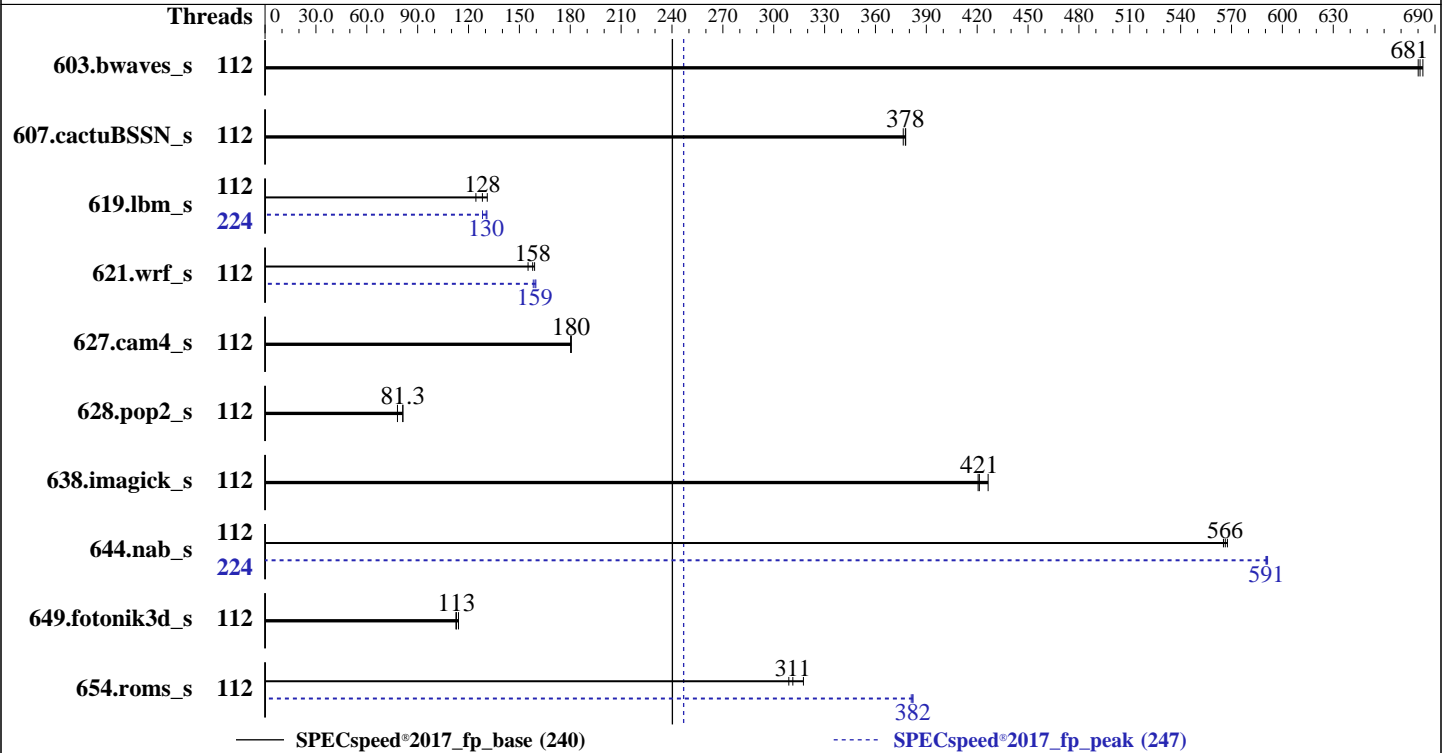
Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: May-2021

Hardware Availability: Mar-2021

Software Availability: Mar-2021



Hardware

CPU Name: AMD EPYC 7663
 Max MHz: 3500
 Nominal: 2000
 Enabled: 112 cores, 2 chips, 2 threads/core
 Orderable: 1,2 chips
 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 / 7 cores
 Other: None
 Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)
 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 0404 released Feb-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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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	112	86.6	681	86.8	680	86.4	683	112	86.6	681	86.8	680	86.4	683
607.cactuBSSN_s	112	44.3	376	44.1	378	44.1	378	112	44.3	376	44.1	378	44.1	378
619.lbm_s	112	40.0	131	40.9	128	42.1	124	224	40.8	128	40.0	131	40.2	130
621.wrf_s	112	83.8	158	85.3	155	83.2	159	112	83.6	158	83.1	159	82.8	160
627.cam4_s	112	49.2	180	49.1	180	49.1	181	112	49.2	180	49.1	180	49.1	181
628.pop2_s	112	146	81.3	152	78.1	146	81.3	112	146	81.3	152	78.1	146	81.3
638.imagick_s	112	34.3	421	34.2	421	33.8	426	112	34.3	421	34.2	421	33.8	426
644.nab_s	112	30.8	568	30.9	566	30.9	565	224	29.5	591	29.6	591	29.6	590
649.fotonik3d_s	112	81.0	113	79.9	114	80.7	113	112	81.0	113	79.9	114	80.7	113
654.roms_s	112	49.6	318	51.0	309	50.6	311	112	41.3	381	41.2	382	41.2	382

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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
'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,
```

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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 = "0-223"
```

```
LD_LIBRARY_PATH =
```

```
"/cpull8/amd_speed_aocc300_milan_B_lib/64:/cpull8/amd_speed_aocc300_mila
n_B_lib/32:"
```

```
MALLOC_CONF = "retain:true"
```

```
OMP_DYNAMIC = "false"
```

```
OMP_SCHEDULE = "static"
```

```
OMP_STACKSIZE = "128M"
```

```
OMP_THREAD_LIMIT = "224"
```

Environment variables set by runcpu during the 619.lbm_s peak run:

```
GOMP_CPU_AFFINITY = "0 112 1 113 2 114 3 115 4 116 5 117 6 118 7 119 8 120 9
121 10 122 11 123 12 124 13 125 14 126 15 127 16 128 17 129 18 130 19
131 20 132 21 133 22 134 23 135 24 136 25 137 26 138 27 139 28 140 29
141 30 142 31 143 32 144 33 145 34 146 35 147 36 148 37 149 38 150 39
151 40 152 41 153 42 154 43 155 44 156 45 157 46 158 47 159 48 160 49
161 50 162 51 163 52 164 53 165 54 166 55 167 56 168 57 169 58 170 59
171 60 172 61 173 62 174 63 175 64 176 65 177 66 178 67 179 68 180 69
181 70 182 71 183 72 184 73 185 74 186 75 187 76 188 77 189 78 190 79
191 80 192 81 193 82 194 83 195 84 196 85 197 86 198 87 199 88 200 89
201 90 202 91 203 92 204 93 205 94 206 95 207 96 208 97 209 98 210 99
211 100 212 101 213 102 214 103 215 104 216 105 217 106 218 107 219 108
220 109 221 110 222 111 223"
```

Environment variables set by runcpu during the 621.wrf_s peak run:

```
GOMP_CPU_AFFINITY = "0-111"
```

Environment variables set by runcpu during the 644.nab_s peak run:

```
GOMP_CPU_AFFINITY = "0 112 1 113 2 114 3 115 4 116 5 117 6 118 7 119 8 120 9
121 10 122 11 123 12 124 13 125 14 126 15 127 16 128 17 129 18 130 19
131 20 132 21 133 22 134 23 135 24 136 25 137 26 138 27 139 28 140 29
141 30 142 31 143 32 144 33 145 34 146 35 147 36 148 37 149 38 150 39
151 40 152 41 153 42 154 43 155 44 156 45 157 46 158 47 159 48 160 49
161 50 162 51 163 52 164 53 165 54 166 55 167 56 168 57 169 58 170 59
171 60 172 61 173 62 174 63 175 64 176 65 177 66 178 67 179 68 180 69
181 70 182 71 183 72 184 73 185 74 186 75 187 76 188 77 189 78 190 79"
```

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Environment Variables Notes (Continued)

```
191 80 192 81 193 82 194 83 195 84 196 85 197 86 198 87 199 88 200 89
201 90 202 91 203 92 204 93 205 94 206 95 207 96 208 97 209 98 210 99
211 100 212 101 213 102 214 103 215 104 216 105 217 106 218 107 219 108
220 109 221 110 222 111 223"
```

Environment variables set by runcpu during the 654.roms_s peak run:

GOMP_CPU_AFFINITY = "0-111"

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 Configuration:

DLWM Support = Disabled

SVM Mode = Disabled

NUMA nodes per socket = NPS1

APBDIS = 1

Fix SOC P-state = P0

Engine Boost = Enabled

sysinfo program /cpull18/bin/sysinfo

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d

running on localhost Tue May 11 15:38:16 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

2 "physical id"s (chips)

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Platform Notes (Continued)

224 "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
physical 1: 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
Address sizes:         48 bits physical, 48 bits virtual
CPU(s):                224
On-line CPU(s) list:  0-223
Thread(s) per core:    2
Core(s) per socket:    56
Socket(s):             2
NUMA node(s):         2
Vendor ID:             AuthenticAMD
CPU family:            25
Model:                 1
Model name:            AMD EPYC 7663 56-Core Processor
Stepping:              1
CPU MHz:               1793.838
CPU max MHz:           2000.0000
CPU min MHz:           1500.0000
BogoMIPS:              3992.35
Virtualization:        AMD-V
L1d cache:             32K
L1i cache:             32K
L2 cache:              512K
L3 cache:              32768K
NUMA node0 CPU(s):    0-55,112-167
NUMA node1 CPU(s):    56-111,168-223
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 xsave 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 bpeext perfctr_llc mwaitx cpb
cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase
bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha_ni
```

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Platform Notes (Continued)

xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm_lock nrip_save tsc_scale
vmcb_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif
umip pku ospke vaes 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 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 55 112
113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134
135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156
157 158 159 160 161 162 163 164 165 166 167

node 0 size: 515814 MB

node 0 free: 515070 MB

node 1 cpus: 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 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106
107 108 109 110 111 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184
185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206
207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223

node 1 size: 516063 MB

node 1 free: 515189 MB

node distances:

```
node  0  1
  0:  10  32
  1:  32  10
```

From /proc/meminfo

```
MemTotal:      1056643384 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"
```

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Platform Notes (Continued)

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):	Not affected
CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):	Mitigation: usercopy/swapgs 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 May 11 11:58

SPEC is set to: /cpull8

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sdb4	xfs	199G	44G	156G	22%	/

```
From /sys/devices/virtual/dmi/id
Vendor:          ASUSTeK COMPUTER INC.
Product:         RS720A-E11-RS12E
Product Family:  Server
Serial:          123456789012
```

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:

- 16x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200
- 16x Unknown Unknown

BIOS:

- BIOS Vendor: American Megatrends Inc.
- BIOS Version: 0404

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Platform Notes (Continued)

BIOS Date: 02/02/2021
BIOS Revision: 4.4

(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)
=====

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
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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)
=====

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Compiler Version Notes (Continued)

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)
=====

```

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

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Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

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 -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

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Base Portability Flags (Continued)

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
-freemap-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
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti
```

Fortran benchmarks:

```
-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 -Hz,1,0x1 -O3
-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
-freemap-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
```

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SPEC CPU®2017 Floating Point Speed Result

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ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.00 GHz, AMD EPYC 7663

SPECspeed®2017_fp_base = 240

SPECspeed®2017_fp_peak = 247

CPU2017 License: 9016

Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: May-2021

Hardware Availability: Mar-2021

Software Availability: Mar-2021

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-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
```

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
```

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Peak Compiler Invocation (Continued)

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
-freemap-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 -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 -freemap-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 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

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Peak Optimization Flags (Continued)

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-licm-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-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,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-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 -flto
-fstruct-layout=5 -mllvm -unroll-threshold=50
-freemap-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



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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

<http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-AMD-Milan-V1.3.html>

<http://www.spec.org/cpu2017/flags/aocc300-flags-A1.html>

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.xml>

<http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml>

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