



# SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

## ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System  
2.80 GHz, AMD EPYC 7573X

SPECspeed®2017\_fp\_base = 247

SPECspeed®2017\_fp\_peak = 257

CPU2017 License: 9016

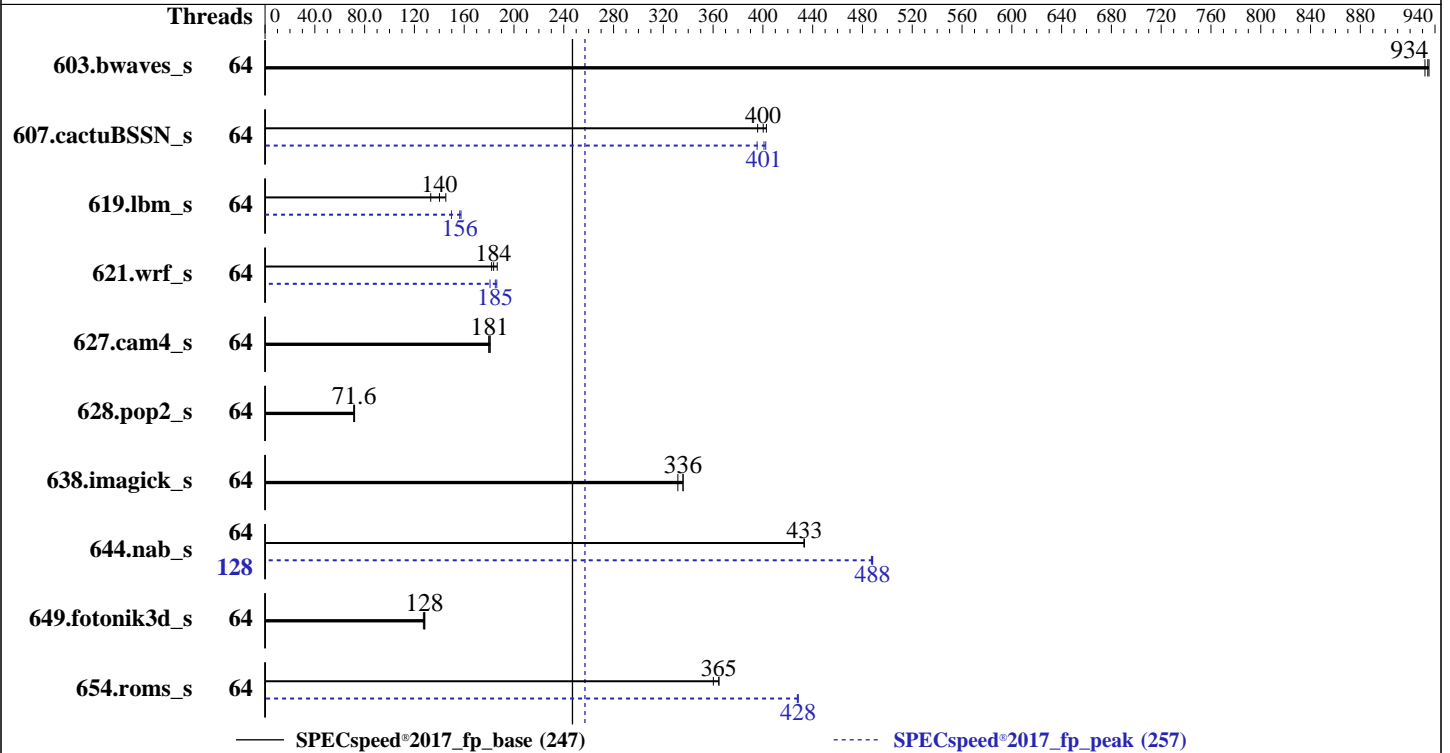
Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: May-2022

Hardware Availability: Mar-2022

Software Availability: Dec-2021



### Hardware

CPU Name: AMD EPYC 7573X  
 Max MHz: 3600  
 Nominal: 2800  
 Enabled: 64 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: 768 MB I+D on chip per chip, 96 MB shared / 4 cores  
 Other: None  
 Memory: 1 TB (16 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 3.2.0 of AOCC  
 Parallel: Yes  
 Firmware: Version 0901 released Nov-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	64	63.1	935	<b><u>63.2</u></b>	<b><u>934</u></b>	63.3	932	64	63.1	935	<b><u>63.2</u></b>	<b><u>934</u></b>	63.3	932
607.cactuBSSN_s	64	41.4	403	<b><u>41.6</u></b>	<b><u>400</u></b>	42.1	396	64	42.2	395	<b><u>41.6</u></b>	<b><u>401</u></b>	41.4	402
619.lbm_s	64	39.4	133	36.1	145	<b><u>37.4</u></b>	<b><u>140</u></b>	64	33.3	157	<b><u>33.5</u></b>	<b><u>156</u></b>	35.0	150
621.wrf_s	64	70.9	187	<b><u>72.0</u></b>	<b><u>184</u></b>	72.7	182	64	71.0	186	<b><u>71.5</u></b>	<b><u>185</u></b>	73.2	181
627.cam4_s	64	49.0	181	49.3	180	<b><u>49.1</u></b>	<b><u>181</u></b>	64	49.0	181	49.3	180	<b><u>49.1</u></b>	<b><u>181</u></b>
628.pop2_s	64	<b><u>166</u></b>	<b><u>71.6</u></b>	167	71.3	165	72.0	64	<b><u>166</u></b>	<b><u>71.6</u></b>	167	71.3	165	72.0
638.imagick_s	64	43.5	332	43.0	336	<b><u>43.0</u></b>	<b><u>336</u></b>	64	43.5	332	43.0	336	<b><u>43.0</u></b>	<b><u>336</u></b>
644.nab_s	64	40.4	433	<b><u>40.3</u></b>	<b><u>433</u></b>	40.3	433	128	<b><u>35.8</u></b>	<b><u>488</u></b>	35.8	488	35.9	487
649.fotonik3d_s	64	71.0	128	<b><u>71.2</u></b>	<b><u>128</u></b>	71.7	127	64	71.0	128	<b><u>71.2</u></b>	<b><u>128</u></b>	71.7	127
654.roms_s	64	43.2	365	43.7	360	<b><u>43.2</u></b>	<b><u>365</u></b>	64	<b><u>36.8</u></b>	<b><u>428</u></b>	36.8	428	36.8	428

SPECSpeed®2017\_fp\_base = **247**

SPECSpeed®2017\_fp\_peak = **257**

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>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty\_ratio=8' run as root.  
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.  
To free node-local memory and avoid remote memory usage,  
'sysctl -w vm.zone\_reclaim\_mode=1' run as root.  
To clear filesystem caches, 'sync; sysctl -w vm.drop\_caches=3' run as root.  
To disable address space layout randomization (ASLR) to reduce run-to-run  
variability, 'sysctl -w kernel.randomize\_va\_space=0' run as root.

(Continued on next page)



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### Operating System Notes (Continued)

To enable Transparent Hugepages (THP) for all allocations,  
 '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:  
 'echo madvise > /sys/kernel/mm/transparent\_hugepage/enabled' run as root.  
 To disable THP for peak runs of 627.cam4\_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 = "0-127"  
 LD\_LIBRARY\_PATH =  
 "/spec2017/amd\_speed\_aocc320\_milanx\_A\_lib/lib;/spec2017/amd\_speed\_aocc320\_milanx\_A\_lib/lib32:"  
 LIBOMP\_NUM\_HIDDEN\_HELPER\_THREADS = "0"  
 MALLOC\_CONF = "retain:true"  
 OMP\_DYNAMIC = "false"  
 OMP\_SCHEDULE = "static"  
 OMP\_STACKSIZE = "128M"  
 OMP\_THREAD\_LIMIT = "128"

Environment variables set by runcpu during the 607.cactuBSSN\_s peak run:  
 GOMP\_CPU\_AFFINITY = "0-63"

Environment variables set by runcpu during the 619.lbm\_s peak run:  
 GOMP\_CPU\_AFFINITY = "0-63"

Environment variables set by runcpu during the 621.wrf\_s peak run:  
 GOMP\_CPU\_AFFINITY = "0-63"

Environment variables set by runcpu during the 644.nab\_s peak run:  
 GOMP\_CPU\_AFFINITY = "0-127"

Environment variables set by runcpu during the 654.roms\_s peak run:  
 GOMP\_CPU\_AFFINITY = "0-63"

### 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.

(Continued on next page)



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### General Notes (Continued)

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 /spec2017/bin/sysinfo

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d

running on localhost Wed May 4 14:21:46 2022

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 7573X 32-Core Processor

2 "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 : 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

physical 1: 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

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### Platform Notes (Continued)

```

CPU(s): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7573X 32-Core Processor
Stepping: 2
CPU MHz: 1786.023
CPU max MHz: 2800.0000
CPU min MHz: 1500.0000
BogoMIPS: 5589.37
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 98304K
NUMA node0 CPU(s): 0-31,64-95
NUMA node1 CPU(s): 32-63,96-127
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 cxl6 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 invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha_ni
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 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

```

node 0 size: 515833 MB

node 0 free: 515094 MB

```

node 1 cpus: 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

```

(Continued on next page)



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### Platform Notes (Continued)

57 58 59 60 61 62 63 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112  
113 114 115 116 117 118 119 120 121 122 123 124 125 126 127

node 1 size: 516075 MB

node 1 free: 515067 MB

node distances:

node 0 1

0: 10 32

1: 32 10

From /proc/meminfo

MemTotal: 1056674768 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):

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

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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 May 4 09:45

SPEC is set to: /spec2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda4	xfs	199G	56G	144G	29%	/

```

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 M386A8K40DM2-CWE 64 GB 4 rank 3200
  16x Unknown Unknown

```

```

BIOS:
  BIOS Vendor:      American Megatrends Inc.
  BIOS Version:     0901
  BIOS Date:        11/23/2021
  BIOS Revision:    9.1

```

(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 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
=====

```

```

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

```

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-----

=====  
Fortran | 603.bwaves\_s(base, peak) 649.fotonik3d\_s(base, peak)  
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Target: x86\_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  
-----

=====  
Fortran, C | 621.wrf\_s(base, peak) 627.cam4\_s(base, peak)  
628.pop2\_s(base, peak)

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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.ibm\_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 -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 -fopenmp -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 -z muldefs

-DSPEC\_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Fortran benchmarks:

-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching

-Wl,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize

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## Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-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 -fopenmp -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 -mllvm -enable-loopinterchange
-mllvm -compute-interchange-order -z muldefs -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

Benchmarks using both Fortran and C:

```
-m64 -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 -fopenmp -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
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang
```

Benchmarks using Fortran, C, and C++:

```
-m64 -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 -fopenmp -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
-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 -mllvm -enable-loopinterchange
-mllvm -compute-interchange-order -z muldefs -DSPEC_OPENMP
```

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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  
2.80 GHz, AMD EPYC 7573X

SPECspeed®2017\_fp\_base = 247

SPECspeed®2017\_fp\_peak = 257

**CPU2017 License:** 9016

**Test Sponsor:** ASUSTeK Computer Inc.

**Tested by:** ASUSTeK Computer Inc.

**Test Date:** May-2022

**Hardware Availability:** Mar-2022

**Software Availability:** Dec-2021

## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

## 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



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## Peak Optimization Flags

C benchmarks:

```
619.lbm_s: -m64 -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 -fopenmp
-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=libomp -lomp -lamdlibm -ljemalloc -lflang
```

638.imagick\_s: basepeak = yes

```
644.nab_s: -m64 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-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 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
-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
-mllvm -do-block-reorder=aggressive -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

Fortran benchmarks:

603.bwaves\_s: basepeak = yes

649.fotonik3d\_s: basepeak = yes

```
654.roms_s: -m64 -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 -fopenmp
-Mrecursive -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
```

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## Peak Optimization Flags (Continued)

654.roms\_s (continued):

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

Benchmarks using both Fortran and C:

```
621.wrf_s: -m64 -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 -fopenmp  
-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 -Mrecursive  
-mllvm -fuse-tile-inner-loop -funroll-loops  
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop  
-mllvm -enable-loopinterchange  
-mllvm -compute-interchange-order -DSPEC_OPENMP  
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

627.cam4\_s: basepeak = yes

628.pop2\_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

```
-m64 -Wl,-mllvm -Wl,-x86-use-vzeroupper=false  
-Wl,-mllvm -Wl,-enable-licm-vrp  
-Wl,-mllvm -Wl,-do-block-reorder=aggressive  
-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 -fopenmp -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  
-finline-aggressive -mllvm -unroll-threshold=100 -mllvm -reroll-loops  
-mllvm -aggressive-loop-unswitch -Mrecursive  
-mllvm -do-block-reorder=aggressive -DSPEC_OPENMP -fopenmp=libomp  
-lomp -lamdlibm -ljemalloc -lflang
```



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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-V1.6.html>

<http://www.spec.org/cpu2017/flags/aocc320-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-V1.6.xml>

<http://www.spec.org/cpu2017/flags/aocc320-flags-A1.xml>

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