SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

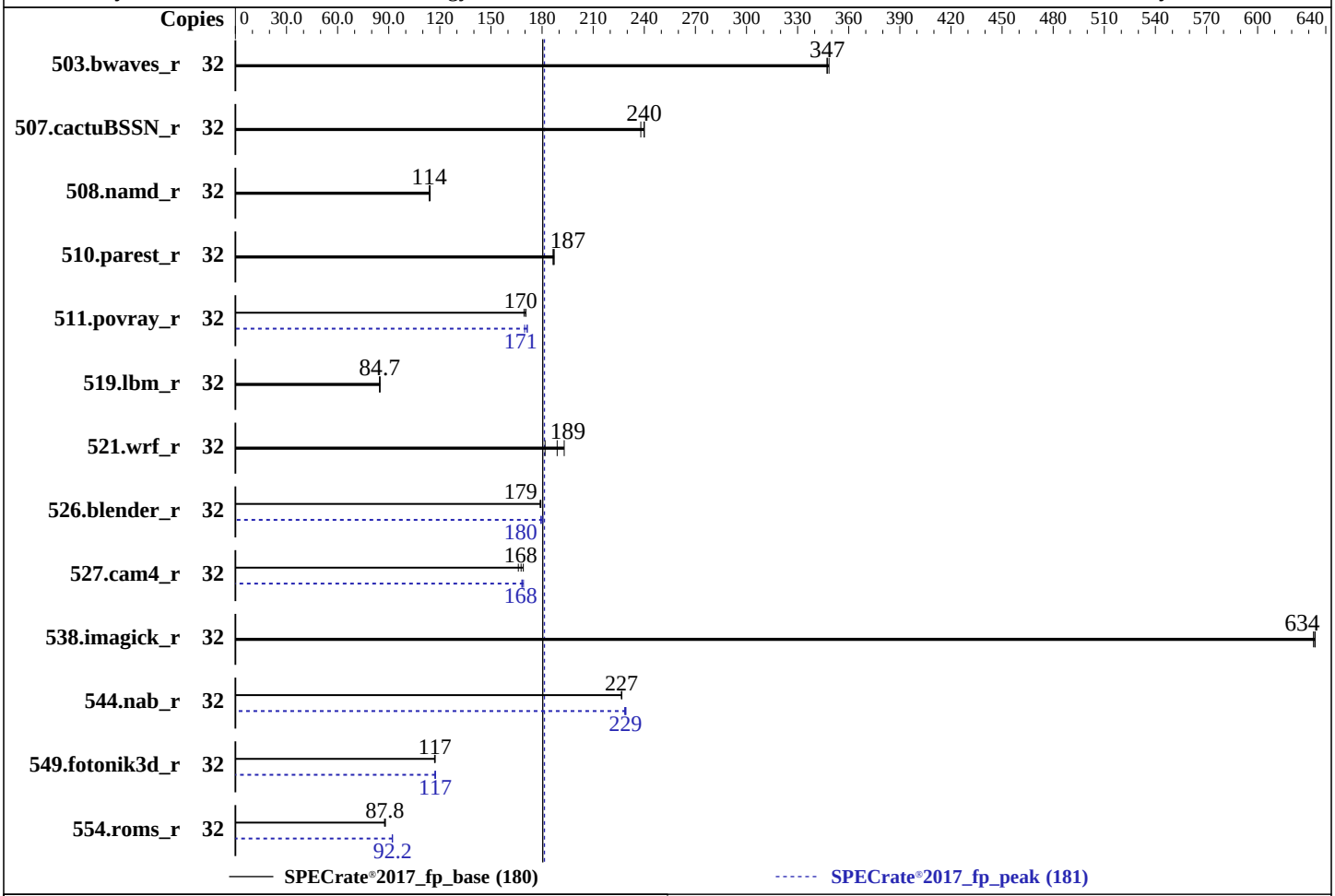
ThinkSystem SR635
3.20 GHz, AMD EPYC 7343

SPECrate®2017_fp_base = 180

SPECrate®2017_fp_peak = 181

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Jun-2021
Hardware Availability: Jun-2021
Software Availability: Mar-2021



Hardware

CPU Name:	AMD EPYC 7343
Max MHz:	3900
Nominal:	3200
Enabled:	16 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:	128 MB I+D on chip per chip, 32 MB shared / 4 cores
Other:	None
Memory:	256 GB (8 x 32 GB 2Rx4 PC4-3200AA-R)
Storage:	1 x 960 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:	No
Firmware:	Lenovo BIOS Version CFE125U 6.0 released May-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

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	32	**924**	**347**	924	347	921	348	32	**924**	**347**	924	347	921	348
507.cactuBSSN_r	32	169	240	170	238	**169**	**240**	32	169	240	170	238	**169**	**240**
508.namd_r	32	**267**	**114**	267	114	266	114	32	**267**	**114**	267	114	266	114
510.parest_r	32	447	187	**448**	**187**	449	186	32	447	187	**448**	**187**	449	186
511.povray_r	32	**439**	**170**	438	170	441	169	32	436	171	440	170	**436**	**171**
519.lbm_r	32	**398**	**84.7**	397	84.9	398	84.7	32	**398**	**84.7**	397	84.9	398	84.7
521.wrf_r	32	394	182	371	193	**380**	**189**	32	394	182	371	193	**380**	**189**
526.blender_r	32	**272**	**179**	272	179	272	179	32	272	179	**271**	**180**	270	180
527.cam4_r	32	**334**	**168**	337	166	331	169	32	331	169	333	168	**333**	**168**
538.imagick_r	32	**126**	**634**	126	633	126	634	32	**126**	**634**	126	633	126	634
544.nab_r	32	**238**	**227**	238	227	237	227	32	235	229	**235**	**229**	236	228
549.fotonik3d_r	32	**1065**	**117**	1064	117	1067	117	32	**1063**	**117**	1062	117	1065	117
554.roms_r	32	578	88.0	**579**	**87.8**	581	87.5	32	**552**	**92.2**	552	92.2	552	92.0

SPECrate®2017_fp_base = 180

SPECrate®2017_fp_peak = 181

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
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.
```

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Operating System Notes (Continued)

'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout randomization (ASLR) to reduce run-to-run variability.
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root for peak integer runs and all FP runs to enable Transparent Hugepages (THP).
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root for base integer runs to enable THP only on request.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
"/home/cpu2017-1.1.8-amd-aocc300-milan-A1/amd_rate_aocc300_milan_A_lib/64;/home/cpu2017-1.1.8-amd-aocc300-milan-A1/amd_rate_aocc300_milan_A_lib/32:"
MALLOC_CONF = "retain:true"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 512GiB 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:
Choose Operating Mode set to Maximum Performance
NUMA nodes per socket set to NPS4

Sysinfo program /home/cpu2017-1.1.8-amd-aocc300-milan-A1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost Tue Jun 29 02:08:14 2021

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see

(Continued on next page)

Platform Notes (Continued)

```
    https://www.spec.org/cpu2017/Docs/config.html#sysinfo

  From /proc/cpuinfo
     model name : AMD EPYC 7343 16-Core Processor
        1  "physical id"s (chips)
        32 "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 : 16
        siblings  : 32
        physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

  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):              32
       On-line CPU(s) list: 0-31
       Thread(s) per core:  2
       Core(s) per socket:  16
       Socket(s):           1
       NUMA node(s):        4
       Vendor ID:           AuthenticAMD
       CPU family:          25
       Model:               1
       Model name:          AMD EPYC 7343 16-Core Processor
       Stepping:            1
       CPU MHz:             3897.814
       CPU max MHz:         3200.0000
       CPU min MHz:         1500.0000
       BogoMIPS:            6387.44
       Virtualization:      AMD-V
       L1d cache:           32K
       L1i cache:           32K
       L2 cache:            512K
       L3 cache:            32768K
       NUMA node0 CPU(s):   0-3,16-19
       NUMA node1 CPU(s):   4-7,20-23
       NUMA node2 CPU(s):   8-11,24-27
       NUMA node3 CPU(s):   12-15,28-31
       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 bpext perfctr_llc mwaitx cpb
```


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Platform Notes (Continued)

```
      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
      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: 4 nodes (0-3)
   node 0 cpus: 0 1 2 3 16 17 18 19
   node 0 size: 64315 MB
   node 0 free: 64087 MB
   node 1 cpus: 4 5 6 7 20 21 22 23
   node 1 size: 64508 MB
   node 1 free: 64330 MB
   node 2 cpus: 8 9 10 11 24 25 26 27
   node 2 size: 64508 MB
   node 2 free: 64282 MB
   node 3 cpus: 12 13 14 15 28 29 30 31
   node 3 size: 64463 MB
   node 3 free: 64257 MB
   node distances:
   node   0   1   2   3
     0:  10  12  12  12
     1:  12  10  12  12
     2:  12  12  10  12
     3:  12  12  12  10

 From /proc/meminfo
    MemTotal:       263983288 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"
```

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Platform Notes (Continued)

```
      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
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort):               Not affected

run-level 3 Jun 29 02:01

SPEC is set to: /home/cpu2017-1.1.8-amd-aocc300-milan-A1
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda3      xfs   892G   67G  825G   8% /

From /sys/devices/virtual/dmi/id
    Vendor:         Lenovo
    Product:        ThinkSystem SR635 -[7Y00000000]-
    Product Family: ThinkSystem
    Serial:         0123456789

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 M393A4K40DB3-CWE 32 GB 2 rank 3200
    8x Unknown Unknown

BIOS:
```

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Platform Notes (Continued)

```
    BIOS Vendor:       Lenovo
    BIOS Version:      CFE125U
    BIOS Date:         05/28/2021
    BIOS Revision:     6.0

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                | 544.nab_r(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++             | 508.namd_r(base, peak) 510.parest_r(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          | 511.povray_r(base, peak) 526.blender_r(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
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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Compiler Version Notes (Continued)

```
C++, C, Fortran | 507.cactuBSSN_r(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
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         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                | 554.roms_r(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      | 521.wrf_r(base, peak) 527.cam4_r(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
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
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using both C and C++:
clang++ clang

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

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
526.blender_r: -funsigned-char -D__BOOL_DEFINED -DSPEC_LP64
527.cam4_r: -DSPEC_CASE_FLAG -DSPEC_LP64
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -flto -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 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5

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Base Optimization Flags (Continued)

C benchmarks (continued):
-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
-lamdlibm -ljemalloc -lflang -lflangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-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 -ffast-math
-march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-z muldefs -lamdlibm -ljemalloc -lflang -lflangrti

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -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 -ffast-math
-march=znver3 -fveclib=AMDLIBM -Kieee -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 -lamdlibm -ljemalloc
-lflang -lflangrti

Benchmarks using both Fortran and C:
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -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 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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
-Kieee -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti

Benchmarks using both C and C++:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-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 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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
-z muldefs -lamdlibm -ljemalloc -lflang -lflangrti

Benchmarks using Fortran, C, and C++:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-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 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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 -Kieee -Mrecursive -mllvm -fuse-tile-inner-loop
-funroll-loops -mllvm -lsr-in-nested-loop -z muldefs -lamdlibm
-ljemalloc -lflang -lflangrti

Base Other Flags

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

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Base Other Flags (Continued)

C++ benchmarks:
`-Wno-unused-command-line-argument`

Fortran benchmarks:
`-Wno-unused-command-line-argument`

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

Benchmarks using both C and C++:
`-Wno-unused-command-line-argument`

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

Peak Compiler Invocation

C benchmarks:
`clang`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Benchmarks using both Fortran and C:
`flang clang`

Benchmarks using both C and C++:
`clang++ clang`

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

Peak Portability Flags

`Same as Base Portability Flags`

Peak Optimization Flags

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `basepeak = yes`

544.nab_r: `-m64 -flto -Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3 -fveclib=AMDLIBM -fstruct-layout=7 -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 -lamdlibm -ljemalloc`

C++ benchmarks:

508.namd_r: `basepeak = yes`

510.parest_r: `basepeak = yes`

Fortran benchmarks:

503.bwaves_r: `basepeak = yes`

549.fotonik3d_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching -Wl,-mllvm -Wl,-enable-licm-vrp -flto -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 -Kieee -Mrecursive -mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp -lamdlibm -ljemalloc -lflang -lflangrti`

554.roms_r: `-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching -Wl,-mllvm -Wl,-enable-licm-vrp -flto -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 -Kieee -Mrecursive -mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp -Hz,1,0x1 -mllvm -fuse-tile-inner-loop -lamdlibm -ljemalloc -lflang -lflangrti`

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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes

527.cam4_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-force-vector-interleave=1 -Ofast
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7
-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 -O3 -ffast-math
-funroll-loops -mllvm -extra-vectorizer-passes
-mllvm -lsr-in-nested-loop -Mrecursive -lamdlibm
-ljemalloc -lflang -lflangrti

Benchmarks using both C and C++:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-enable-licm-vrp
-flto -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 -fstruct-layout=7 -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 -lamdlibm -ljemalloc

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

Peak Other Flags

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

C++ benchmarks:
-Wno-unused-command-line-argument

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Peak Other Flags (Continued)

Fortran benchmarks:
`-Wno-unused-command-line-argument`

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

Benchmarks using both C and C++:
`-Wno-unused-command-line-argument`

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

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Milan1P-G.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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Milan1P-G.xml`
`http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml`

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