SPEC CPU®2017 Floating Point Speed Result

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Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7252 8-Core)

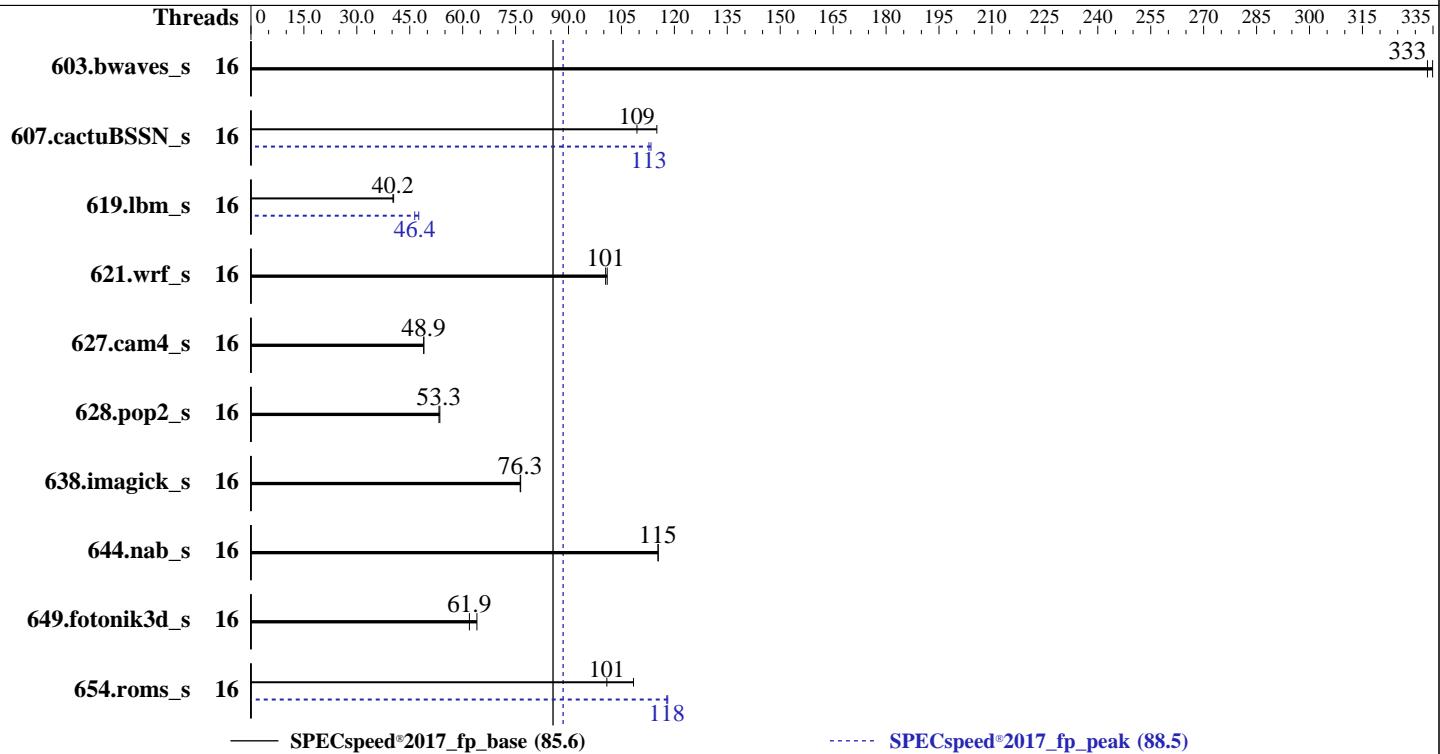$SPECspeed®2017\_fp\_base = 85.6$

$SPECspeed®2017\_fp\_peak = 88.5$

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems

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

Threads scale: 0 15.0 30.0 45.0 60.0 75.0 90.0 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 335

- **603.bwaves_s** 16 — 333
- **607.cactuBSSN_s** 16 — 109 / 113
- **619.lbm_s** 16 — 40.2 / 46.4
- **621.wrf_s** 16 — 101
- **627.cam4_s** 16 — 48.9
- **628.pop2_s** 16 — 53.3
- **638.imagick_s** 16 — 76.3
- **644.nab_s** 16 — 115
- **649.fotonik3d_s** 16 — 61.9
- **654.roms_s** 16 — 101 / 118

SPECspeed®2017_fp_base (85.6)
SPECspeed®2017_fp_peak (88.5)

Hardware

CPU Name: AMD EPYC 7252
 Max MHz: 3200
 Nominal: 3100
Enabled: 16 cores, 2 chips
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: 64 MB I+D on chip per chip,
 16 MB shared / 2 cores
Other: None
Memory: 2 TB (16 x 128 GB 4Rx4 PC4-3200V-L)
Storage: 1 x 960 GB M.2 SSD SATA
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP3 (x86_64)
 5.3.18-57-default
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
Parallel: Yes
Firmware: Version 4.2.1c released Aug-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	16	176	335	**177**	**333**			16	176	335	**177**	**333**		
607.cactuBSSN_s	16	145	115	**152**	**109**			16	147	113	**148**	**113**		
619.lbm_s	16	130	40.4	**130**	**40.2**			16	110	47.6	**113**	**46.4**		
621.wrf_s	16	131	101	**132**	**101**			16	131	101	**132**	**101**		
627.cam4_s	16	181	49.0	**181**	**48.9**			16	181	49.0	**181**	**48.9**		
628.pop2_s	16	222	53.5	**223**	**53.3**			16	222	53.5	**223**	**53.3**		
638.imagick_s	16	**189**	**76.3**	189	76.4			16	**189**	**76.3**	189	76.4		
644.nab_s	16	151	115	**151**	**115**			16	151	115	**151**	**115**		
649.fotonik3d_s	16	142	64.0	**147**	**61.9**			16	142	64.0	**147**	**61.9**		
654.roms_s	16	145	108	**156**	**101**			16	133	118	**134**	**118**		
SPECspeed®2017_fp_base =		**85.6**												
SPECspeed®2017_fp_peak =		**88.5**												

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

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu
ASLR is disabled to reduce run-to-run issues.

dirty_ratio, swappiness, zone_reclaim_mode, drop_caches and ASLR were
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).
```

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Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

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$SPECspeed^{®}2017\_fp\_base = 85.6$

$SPECspeed^{®}2017\_fp\_peak = 88.5$

Operating System Notes (Continued)

```
Transparent huge pages set to 'always' for this run (OS default)
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-15"
LD_LIBRARY_PATH =
     "/home/cpu2017/amd_speed_aocc300_milan_B_lib/64;/home/cpu2017/amd_speed_
     aocc300_milan_B_lib/32:"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "592M"
OMP_THREAD_LIMIT = "16"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0 8 1 9 2 10 3 11 4 12 5 13 6 14 7 15"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-15"
```

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

```
 SMT Mode set to Disabled
 NUMA nodes per socket set to NPS1
 ACPI SRAT L3 Cache As NUMA Domain set to Enabled
```

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Hardware Availability: Jun-2021
Software Availability: Jun-2021

Platform Notes (Continued)

```
DRAM Scrub Time set to Disabled
Determinism Slider set to Power
L1 Stream HW Prefetcher set to Enabled
APBDIS set to 1

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost Wed Dec  1 13:01:45 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 7252 8-Core Processor
      2  "physical id"s (chips)
      16 "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 : 8
      siblings  : 8
      physical 0: cores 0 1 4 5 8 9 12 13
      physical 1: cores 0 1 4 5 8 9 12 13

From lscpu from util-linux 2.36.2:
      Architecture:            x86_64
      CPU op-mode(s):          32-bit, 64-bit
      Byte Order:              Little Endian
      Address sizes:           43 bits physical, 48 bits virtual
      CPU(s):                  16
      On-line CPU(s) list:     0-15
      Thread(s) per core:      1
      Core(s) per socket:      8
      Socket(s):               2
      NUMA node(s):            8
      Vendor ID:               AuthenticAMD
      CPU family:              23
      Model:                   49
      Model name:              AMD EPYC 7252 8-Core Processor
      Stepping:                0
      Frequency boost:         enabled
      CPU MHz:                 1851.248
      CPU max MHz:             3100.0000
      CPU min MHz:             1500.0000
      BogoMIPS:                6188.03
      Virtualization:          AMD-V
      L1d cache:               512 KiB
```

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Platform Notes (Continued)

```
    L1i cache:                    512 KiB
    L2 cache:                     8 MiB
    L3 cache:                     128 MiB
    NUMA node0 CPU(s):            0,1
    NUMA node1 CPU(s):            2,3
    NUMA node2 CPU(s):            4,5
    NUMA node3 CPU(s):            6,7
    NUMA node4 CPU(s):            8,9
    NUMA node5 CPU(s):            10,11
    NUMA node6 CPU(s):            12,13
    NUMA node7 CPU(s):            14,15
    Vulnerability Itlb multihit:   Not affected
    Vulnerability L1tf:            Not affected
    Vulnerability Mds:            Not affected
    Vulnerability Meltdown:        Not affected
    Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
    prctl and seccomp
    Vulnerability Spectre v1:       Mitigation; usercopy/swapgs barriers and __user
    pointer sanitization
    Vulnerability Spectre v2:       Mitigation; Full AMD retpoline, IBPB conditional,
    IBRS_FW, STIBP disabled, RSB filling
    Vulnerability Srbds:          Not affected
    Vulnerability Tsx async abort:  Not affected
    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 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 cat_l3 cdp_l3 hw_pstate sme ssbd mba sev ibrs ibpb stibp
    vmmcall sev_es fsgsbase bmi1 avx2 smep bmi2 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 avic
    v_vmsave_vmload vgif umip rdpid overflow_recov succor smca

  From lscpu --cache:
    NAME ONE-SIZE ALL-SIZE WAYS TYPE         LEVEL   SETS PHY-LINE COHERENCY-SIZE
    L1d      32K     512K    8 Data           1    64       1            64
    L1i      32K     512K    8 Instruction    1    64       1            64
    L2      512K       8M    8 Unified        2  1024       1            64
    L3       16M     128M   16 Unified        3 16384       1            64

  /proc/cpuinfo cache data
    cache size : 512 KB

  From numactl --hardware
```

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Software Availability: Jun-2021

Platform Notes (Continued)

```
WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 8 nodes (0-7)
  node 0 cpus: 0 1
  node 0 size: 257863 MB
  node 0 free: 257703 MB
  node 1 cpus: 2 3
  node 1 size: 258046 MB
  node 1 free: 257895 MB
  node 2 cpus: 4 5
  node 2 size: 258046 MB
  node 2 free: 257940 MB
  node 3 cpus: 6 7
  node 3 size: 245938 MB
  node 3 free: 245800 MB
  node 4 cpus: 8 9
  node 4 size: 258046 MB
  node 4 free: 257898 MB
  node 5 cpus: 10 11
  node 5 size: 258012 MB
  node 5 free: 257847 MB
  node 6 cpus: 12 13
  node 6 size: 258046 MB
  node 6 free: 257874 MB
  node 7 cpus: 14 15
  node 7 size: 258045 MB
  node 7 free: 257922 MB
  node distances:
  node   0   1   2   3   4   5   6   7
    0:  10  11  11  11  32  32  32  32
    1:  11  10  11  11  32  32  32  32
    2:  11  11  10  11  32  32  32  32
    3:  11  11  11  10  32  32  32  32
    4:  32  32  32  32  10  11  11  11
    5:  32  32  32  32  11  10  11  11
    6:  32  32  32  32  11  11  10  11
    7:  32  32  32  32  11  11  11  10

From /proc/meminfo
  MemTotal:       2101297508 kB
  HugePages_Total:         0
  Hugepagesize:         2048 kB

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

From /etc/*release* /etc/*version*
  os-release:
```

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Platform Notes (Continued)

```
        NAME="SLES"
        VERSION="15-SP3"
        VERSION_ID="15.3"
        PRETTY_NAME="SUSE Linux Enterprise Server 15 SP3"
        ID="sles"
        ID_LIKE="suse"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:15:sp3"

   uname -a:
      Linux localhost 5.3.18-57-default #1 SMP Wed Apr 28 10:54:41 UTC 2021 (ba3c2e9) 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:
                                                      disabled, RSB filling
   CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
   CVE-2019-11135 (TSX Asynchronous Abort):           Not affected

   run-level 3 Dec 1 02:00

   SPEC is set to: /home/cpu2017
      Filesystem      Type  Size  Used Avail Use% Mounted on
      /dev/sdb3       xfs   557G   11G  546G   2% /

   From /sys/devices/virtual/dmi/id
       Vendor:         Cisco Systems Inc
       Product:        UCSC-C225-M6S
       Serial:         WZP252309U3

   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:
```

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Tested by:	Cisco Systems	**Software Availability:** Jun-2021

Platform Notes (Continued)

```
      16x 0xCE00 M386AAG40AM3-CWE 128 GB 4 rank 3200

 BIOS:
    BIOS Vendor:        Cisco Systems Inc
    BIOS Version:       C225M6.4.2.1c.0.0806211349
    BIOS Date:          08/06/2021
    BIOS Revision:      5.14

 (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
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
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  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
------------------------------------------------------------------------------


==============================================================================
Fortran            | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
                   | 654.roms_s(base, peak)
```

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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
--------------------------------------------------------------------------


==========================================================================
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
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`

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`

(Continued on next page)

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Base Portability Flags (Continued)

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-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`

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SPEC CPU®2017 Floating Point Speed Result

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Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7252 8-Core)

SPECspeed®2017_fp_base = 85.6

SPECspeed®2017_fp_peak = 88.5

CPU2017 License: 9019   **Test Date:**   Dec-2021
Test Sponsor: Cisco Systems   **Hardware Availability:** Jun-2021
Tested by: Cisco Systems   **Software Availability:** Jun-2021

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-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
```

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
```

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

```
638.imagick_s: basepeak = yes
```

```
644.nab_s: basepeak = yes
```

Fortran benchmarks:

```
603.bwaves_s: basepeak = yes
```

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Cisco Systems

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

Peak Optimization Flags (Continued)

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: `basepeak = yes`

627.cam4_s: `basepeak = yes`

628.pop2_s: `basepeak = yes`

Benchmarks using Fortran, C, and C++:
`-m64 -mno-adx -mno-sse4a -std=c++98`
`-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -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 -DSPEC_OPENMP -fopenmp`
`-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang`

Peak Other Flags

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

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

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Peak Other Flags (Continued)

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/aocc300-flags-B2.html
http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-AMD-v2-revC.html
```

You can also download the XML flags sources by saving the following links:
```
http://www.spec.org/cpu2017/flags/aocc300-flags-B2.xml
http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-AMD-v2-revC.xml
```

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