Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)

| SPECspeed®2017_fp_base = 88.1 | SPECspeed®2017_fp_peak = 92.6 |

<table>
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<tr>
<th>CPU2017 License:</th>
<th>9019</th>
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<td>Test Sponsor:</td>
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<td>Test Date:</td>
<td>Dec-2021</td>
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<td>Hardware Availability:</td>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<td>607.cactuBSSN_s</td>
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<td>621.wrf_s</td>
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<tr>
<td>654.roms_s</td>
<td>16</td>
<td>122</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** AMD EPYC 7302
- **Max MHz:** 3300
- **Nominal:** 3000
- **Enabled:** 16 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chips
- **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, 16 MB shared / 2 cores
- **Other:** None
- **Memory:** 1 TB (8 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
Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)

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

Results Table

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</table>

**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>

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.
To enable Transparent Hugepages (THP) for all allocations,

(Continued on next page)
Cisco Systems
Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)

SPECspeed®2017_fp_base = 88.1
SPECspeed®2017_fp_peak = 92.6

Operating System Notes (Continued)
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-31"
LD_LIBRARY_PATH = 
"/home/cpu2017/amd_speed_aocc300_milan_B_lib/lib;/home/cpu2017/amd_speed_aocc300_milan_B_lib/lib32:"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "592M"
OMP_THREAD_LIMIT = "32"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26 11 27 12 28 13 29 14 30 15 31"

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
Cisco Systems
Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)

SPECspeed®2017_fp_base = 88.1
SPECspeed®2017_fp_peak = 92.6

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

Platform Notes

SMT Mode set to Auto
NUMA nodes per socket set to NPS1
ACPI SRAT L3 Cache As NUMA Domain set to Enabled
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 982a61ec0915b55891ef0e16aca6c64d
running on localhost Sun Dec 12 21:28:39 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 7302 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 4 5 8 9 12 13 16 17 20 21 24 25 28 29

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): 32
  On-line CPU(s) list: 0-31
  Thread(s) per core: 2
  Core(s) per socket: 16
  Socket(s): 1
  NUMA node(s): 8
  Vendor ID: AuthenticAMD
  CPU family: 23
  Model: 49
  Model name: AMD EPYC 7302 16-Core Processor
  Stepping: 0
  Frequency boost: enabled
  CPU MHz: 1709.671
  CPU max MHz: 3000.000
  CPU min MHz: 1500.000
  BogoMIPS: 5988.90

(Continued on next page)
Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Test Date: Dec-2021
CPU2017 License: 9019
Test Sponsor: Cisco Systems
Test Date: Dec-2021

**SPEC CPU®2017 Floating Point Speed Result**

**SPECspeed®2017_fp_base = 88.1**

**SPECspeed®2017_fp_peak = 92.6**

---

**Platform Notes (Continued)**

- **Virtualization:** AMD-V
- **L1d cache:** 512 KiB
- **L1i cache:** 512 KiB
- **L2 cache:** 8 MiB
- **L3 cache:** 128 MiB
- **NUMA node0 CPU(s):** 0, 1, 16, 17
- **NUMA node1 CPU(s):** 2, 3, 18, 19
- **NUMA node2 CPU(s):** 4, 5, 20, 21
- **NUMA node3 CPU(s):** 6, 7, 22, 23
- **NUMA node4 CPU(s):** 8, 9, 24, 25
- **NUMA node5 CPU(s):** 10, 11, 26, 27
- **NUMA node6 CPU(s):** 12, 13, 28, 29
- **NUMA node7 CPU(s):** 14, 15, 30, 31
- **Vulnerability Itlb multihit:** Not affected
- **Vulnerability Lttf:** 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 conditional, RSB filling
- **Vulnerability Srbd:** Not affected
- **Vulnerability Tsx async abort:** Not affected
- **Flags:** fpu vme de pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdscpr lm constant_tsc rep_good nopb nonstop_tsc cpuid extd_apicid aperfmpref perfcore pid 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 3nowprefetch osvw ibs skinit wdt tce topoext perfmemcore perfmem_nb bext perfctr_llc mwaitx cpb cat_13 cdq_13 hw_pstate sme ssbd mba sev ibrs ibpb stibp vmmcall sev es fsxgsbase bmi1 avx2 smep bmi2 cmx rdt_a rdsed adx smap clflushopt clwb sha ni xsaveopt xsaveopt xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mmb_total cqm_mmb_local clzero irperf xsaveprtr wbnoinvd arat npt lbv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist pfthreshold avic v_vmsave_vmload vgic umip rpdpid 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
Cisco Systems
Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Test Date: Dec-2021
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Hardware Availability: Jun-2021
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SPECspeed®2017_fp_base = 88.1
SPECspeed®2017_fp_peak = 92.6

Platform Notes (Continued)

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 8 nodes (0-7)
node 0 cpus: 0 1 16 17
node 0 size: 128839 MB
node 0 free: 128592 MB
node 1 cpus: 2 3 18 19
node 1 size: 129022 MB
node 1 free: 128995 MB
node 2 cpus: 4 5 20 21
node 2 size: 128988 MB
node 2 free: 128988 MB
node 3 cpus: 6 7 22 23
node 3 size: 129022 MB
node 3 free: 128912 MB
node 4 cpus: 8 9 24 25
node 4 size: 129022 MB
node 4 free: 128801 MB
node 5 cpus: 10 11 26 27
node 5 size: 129022 MB
node 5 free: 129022 MB
node 6 cpus: 12 13 28 29
node 6 size: 129022 MB
node 6 free: 128868 MB
node 7 cpus: 14 15 30 31
node 7 size: 116912 MB
node 7 free: 116748 MB
node distances:

From /proc/meminfo
MemTotal: 1044330328 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

(Continued on next page)
## Platform Notes (Continued)

From `/etc/*release* /etc/*version*`
```
  os-release:
    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/swapsps barriers and __user pointer sanitization
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling
- **CVE-2020-0543 (Special Register Buffer Data Sampling):** Not affected
- **CVE-2019-11135 (TSX Asynchronous Abort):** Not affected

**run-level 3 Dec 12 10:20**

**SPEC is set to:** /home/cpu2017

<table>
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<th>Used</th>
<th>Avail</th>
<th>Use%</th>
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<tr>
<td>/dev/sda3</td>
<td>xfs</td>
<td>557G</td>
<td>12G</td>
<td>546G</td>
<td>2%</td>
<td>/</td>
</tr>
</tbody>
</table>

From `/sys/devices/virtual/dmi/id`
```
  Vendor: Cisco Systems Inc
  Product: To
```

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.
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CPU2017 License: 9019
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Hardware Availability: Jun-2021
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Platform Notes (Continued)

Memory:
8x 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
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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)
(Continued on next page)
Cisco Systems
Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)

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**Compiler Version Notes (Continued)**

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<tr>
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---

| 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 |

---

**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.cactusSNN_s: -DSPEC_LP64

(Continued on next page)
Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)

SPECspeed®2017_fp_base = 88.1
SPECspeed®2017_fp_peak = 92.6

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

Base Portability Flags (Continued)

619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mlllvm -Wl,-region-vectorize
-Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -03 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000
-fremap-arrays -mlllvm -function-specialize -flv-function-specialization
-mlllvm -enable-gvn-hoist -mlllvm -global-vectorize-slp=true
-mlllvm -enable-lcmp-vrp -mlllvm -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mlllvm -Wl,-enable-X86-prefetching
-Wl,-mlllvm -Wl,-enable-lcim-vrp -Wl,-mlllvm -Wl,-region-vectorize
-Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -Hz,1,0x1 -03
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mlllvm -fuse-tile-inner-loop -funroll-loops
-mlllvm -extra-vectorizer-passes -mlllvm -lsr-in-nested-loop
-mlllvm -enable-lcim-vrp -mlllvm -reduce-array-computations=3
-mlllvm -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,-mlllvm -Wl,-enable-X86-prefetching
-Wl,-mlllvm -Wl,-enable-lcim-vrp -Wl,-mlllvm -Wl,-region-vectorize
-Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -03 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5

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Cisco Systems
Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)

SPECspeed®2017_fp_base = 88.1
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Base Optimization Flags ( Continued )

Benchmarks using both Fortran and C (continued):
-mlirv -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mlirv -enable-gvn-hoist -mlirv -global-vectorize-slp=true
-mlirv -enable-licm-vrp -mlirv -reduce-array-computations=3 -Hz,1,0x1
-Mrecursive -mlirv -fuse-tile-inner-loop -funroll-loops
-mlirv -extra-vectorizer-passes -mlirv -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, -mlirv -Wl,-x86-use-vzeroupper=false
-Wl, -mlirv -Wl,-region-vectorize -Wl,-mlirv -Wl,-function-specialize
-Wl, -mlirv -Wl,-align-all-nofallthru-blocks=6
-Wl, -mlirv -Wl,-reduce-array-computations=3 -o3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mlirv -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mlirv -function-specialize -flv-function-specialization
-mlirv -enable-gvn-hoist -mlirv -global-vectorize-slp=true
-mlirv -enable-licm-vrp -mlirv -reduce-array-computations=3
-mlirv -enable-partial-unswitch -mlirv -unroll-threshold=100
-finline-aggressive -mlirv -loop-unswitch-threshold=200000
-mlirv -reroll-loops -mlirv -aggressive-loop-unswitch
-mlirv -extra-vectorizer-passes -mlirv -convert-pow-exp-to-int=false
-Hz,1,0x1 -Mrecursive -mlirv -fuse-tile-inner-loop -funroll-loops
-mlirv -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
## Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)

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<tr>
<th>SPEC CPU®2017 Floating Point Speed Result</th>
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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-nofallback-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-llicm-vrp
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -landllibm -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 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-llicm-vrp
```

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Cisco Systems
Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)  

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Software Availability: Jun-2021

Peak Optimization Flags (Continued)

644.nab_s (continued):
-mlllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp  
-fopenmp=libomp -lomp -lamlibm -ljemalloc -lflang

Fortran benchmarks:

603.bwaves_s: basepeak = yes

649.fotonik3d_s: basepeak = yes

654.roms_s: -m64 -mno-adx -mno-sse4a  
-Wl,-mlllvm -Wl,-enable-X86-prefetching  
-Wl,-mlllvm -Wl,-enable-licm-vrp  
-Wl,-mlllvm -Wl,-function-specialize  
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast  
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive  
-mlllvm -reduce-array-computations=3  
-mlllvm -global-vectorize-slp=true -mlllvm -enable-licm-vrp  
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamlibm  
-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++:

607.cactuBSSN_s: basepeak = yes

Peak Other Flags

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

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

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

(Continued on next page)
### Cisco Systems

**Cisco UCS C225 M6 (AMD EPYC 7302 16-Core)**

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#### Peak Other Flags (Continued)

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

The flags files that were used to format this result can be browsed at:

You can also download the XML flags sources by saving the following links:

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