# SPEC CPU®2017 Floating Point Speed Result

## Cisco Systems

**Cisco UCS C225 M6 (AMD EPYC 7313P 16-Core)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>112</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>115</td>
</tr>
</tbody>
</table>

### CPU2017 License: 9019

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Cisco Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by:</td>
<td>Cisco Systems</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Dec-2021</td>
</tr>
<tr>
<td>Hardware Avail:</td>
<td>Jun-2021</td>
</tr>
<tr>
<td>Software Avail:</td>
<td>Jun-2021</td>
</tr>
</tbody>
</table>

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>16</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>16</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>16</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_fp_base (112) SPECspeed®2017_fp_peak (115)

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>AMD EPYC 7313P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>3700</td>
</tr>
<tr>
<td>Nominal:</td>
<td>3000</td>
</tr>
<tr>
<td>Enabled:</td>
<td>16 cores, 1 chip</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>512 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>128 MB I+D on chip per chip, 32 MB shared / 4 cores</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>1 TB (8 x 128 GB 4Rx4 PC4-3200V-L)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 1.6 TB SSD SATA</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 15 SP3 (x86_64) 5.3.18-57-default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++/Fortran: Version 3.0.0 of AOCC</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Version 4.2.1c released Aug-2021 xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc: jemalloc memory allocator library v5.1.0</td>
</tr>
<tr>
<td>Power Management:</td>
<td>BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>
Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7313P 16-Core)

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>166</td>
<td>356</td>
<td></td>
<td>166</td>
<td>355</td>
<td></td>
<td></td>
</tr>
<tr>
<td>607.cactubsns_s</td>
<td>16</td>
<td>106</td>
<td>157</td>
<td>106</td>
<td>158</td>
<td>105</td>
<td></td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>16</td>
<td>94.8</td>
<td>55.2</td>
<td>94.7</td>
<td>55.3</td>
<td>94.8</td>
<td>55.3</td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>90.1</td>
<td>147</td>
<td>90.2</td>
<td>147</td>
<td>90.2</td>
<td>147</td>
<td>90.2</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
<td>133</td>
<td>66.6</td>
<td>133</td>
<td>66.6</td>
<td>133</td>
<td>66.6</td>
<td>133</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
<td>139</td>
<td>85.3</td>
<td>140</td>
<td>85.0</td>
<td>138</td>
<td>85.0</td>
<td>138</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
<td>142</td>
<td>101</td>
<td>142</td>
<td>102</td>
<td>143</td>
<td>101</td>
<td>143</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>16</td>
<td>121</td>
<td>144</td>
<td>121</td>
<td>144</td>
<td>121</td>
<td>144</td>
<td>121</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>134</td>
<td>68.1</td>
<td>134</td>
<td>68.0</td>
<td>134</td>
<td>68.0</td>
<td>134</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>127</td>
<td>124</td>
<td>127</td>
<td>124</td>
<td>127</td>
<td>124</td>
<td>127</td>
</tr>
</tbody>
</table>

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>

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,
## 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 = "0-15"
- 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 = "16G"
- 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 = "0-15"

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
Cisco Systems
Cisco UCS C225 M6 (AMD EPYC 7313P 16-Core)

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

Platform Notes

SMT Mode set to Disabled
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 982a61ec0915b55891ef0e16acafc64d
running on localhost Sun Dec 12 03:58:25 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 7313P 16-Core Processor
1 "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 : 16
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu from util-linux 2.36.2:
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): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 16
Socket(s): 1
NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7313P 16-Core Processor
Stepping: 1
Frequency boost: enabled
CPU MHz: 1793.037
CPU max MHz: 3000.000
CPU min MHz: 1500.000
BogoMIPS: 5988.64

(Continued on next page)
Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7313P 16-Core)

**SPECspeed®2017_fp_base** = 112

**SPECspeed®2017_fp_peak** = 115

---

**CPU2017 License:** 9019

**Test Date:** Dec-2021

**Test Sponsor:** Cisco Systems

**Hardware Availability:** Jun-2021

**Tested by:** Cisco Systems

**Software Availability:** Jun-2021

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### Platform Notes (Continued)

<table>
<thead>
<tr>
<th>Virtualization:</th>
<th>AMD-V</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d cache:</td>
<td>512 KiB</td>
</tr>
<tr>
<td>L1i cache:</td>
<td>512 KiB</td>
</tr>
<tr>
<td>L2 cache:</td>
<td>8 MiB</td>
</tr>
<tr>
<td>L3 cache:</td>
<td>128 MiB</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-3</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>4-7</td>
</tr>
<tr>
<td>NUMA node2 CPU(s):</td>
<td>8-11</td>
</tr>
<tr>
<td>NUMA node3 CPU(s):</td>
<td>12-15</td>
</tr>
<tr>
<td>Vulnerability Itlb multihit:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Vulnerability L1tf:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Vulnerability Mds:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Vulnerability Meltdown:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Vulnerability Spec store bypass:</td>
<td>Mitigation; Speculative Store Bypass disabled via prctl and seccomp</td>
</tr>
<tr>
<td>Vulnerability Spectre v1:</td>
<td>Mitigation; usercopy/swapgs barriers and __user pointer sanitation</td>
</tr>
<tr>
<td>Vulnerability Spectre v2:</td>
<td>Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling</td>
</tr>
<tr>
<td>Vulnerability Srbsds:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Vulnerability Tsx async abort:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Flags:</td>
<td>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 rdscp lm constant tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmpref perfct llc pctl cpuid invpcid single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid cmqm rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsave xmovbe xgetbv1 xsaves cmqm_llc cmqm_occup_llc cmqm_mb_total cmqm_local clzero irperf xsaverpr wbnoinvd amd_pippin arat npt lbv svm_lock nrip_save tsc_scale vmbc_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif umip pku ospke vaes vpcmllqdq rdpid overflow_recover succor smca</td>
</tr>
</tbody>
</table>

From lscpu --cache:

<table>
<thead>
<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d</td>
<td>32K</td>
<td>512K</td>
<td>8</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>512K</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L2</td>
<td>512K</td>
<td>8M</td>
<td>8</td>
<td>Unified</td>
<td>2</td>
<td>1024</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>32M</td>
<td>128M</td>
<td>16</td>
<td>Unified</td>
<td>3</td>
<td>32768</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data

- cache size : 512 KB

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.

---

(Continued on next page)
Cisco Systems
Cisco UCS C225 M6 (AMD EPYC 7313P 16-Core)

SPECspeed®2017_fp_base = 112
SPECspeed®2017_fp_peak = 115

CPU2017 License: 9019
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Platform Notes (Continued)

available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3
node 0 size: 257862 MB
node 0 free: 257497 MB
node 1 cpus: 4 5 6 7
node 1 size: 258046 MB
node 1 free: 257841 MB
node 2 cpus: 8 9 10 11
node 2 size: 258012 MB
node 2 free: 257794 MB
node 3 cpus: 12 13 14 15
node 3 size: 245935 MB
node 3 free: 245709 MB
node distances:
node 0 1 2 3
0: 10 11 11 11
1: 11 10 11 11
2: 11 11 10 11
3: 11 11 11 10

From /proc/meminfo
MemTotal: 1044333900 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-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

(Continued on next page)
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Platform Notes (Continued)

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
  Mitigation: usercopy/swapgs barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1):
  Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Dec 12 03:50
SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme0n1p3 xfs 1.5T 13G 1.5T 1% /

From /sys/devices/virtual/dmi/id
Vendor: Cisco Systems Inc
Product: UCSC-C225-M6N
Serial: WZF25230TMY

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 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: 5.22

(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)
==============================================================================

(Continued on next page)
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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

---

**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)  
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**Fortran, C | 603.bwaves_s(base, peak) 649.fotonik3d_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)  
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**Fortran | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_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

Base Compiler Invocation

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

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

Base Portability Flags

603.bwaves.s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm.s: -DSPEC_LP64
621.wrf.s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4.s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms.s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-ml1vm -Wl,-region-vectorize
-Wl,-ml1vm -Wl,-function-specialize
-Wl,-ml1vm -Wl,-align-all-nofallthru-blocks=6
-Wl,-ml1vm -Wl,-reduce-array-computations=3 -O3 -march=znver3

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Cisco Systems
Cisco UCS C225 M6 (AMD EPYC 7313P 16-Core)  

**SPECspeed®2017_fp_base = 112**  
**SPECspeed®2017_fp_peak = 115**

**CPU2017 License:** 9019  
**Test Date:** Dec-2021

**Test Sponsor:** Cisco Systems  
**Hardware Availability:** Jun-2021

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

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**Base Optimization Flags (Continued)**

C benchmarks (continued):
- `-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5`
- `-mlvm -unroll-threshold=50 -mlllvm -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`
- `-iflang -iflangrti`

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 -iflang -iflangrti`

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`
- `-mlvm -unroll-threshold=50 -mlllvm -inline-threshold=1000`
- `-fremap-arrays -mlvm -function-specialize -flv-function-specialization`
- `-mlvm -enable-gvn-hoist -mlvm -global-vectorize-slp=true`
- `-mlvm -enable-licm-vrp -mlvm -reduce-array-computations=3 -Hz,1,0x1`
- `-Mrecursive -mlvm -fuse-tile-inner-loop -funroll-loops`
- `-mlvm -extra-vectorizer-passes -mlvm -lsr-in-nested-loop -z muldefs`
- `-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc`
- `-iflang -iflangrti`

Benchmarks using Fortran, C, and C++:
- `-m64 -mno-adx -mno-sse4a -std=c++98`
- `-Wl,-mlvm -Wl,-x86-use-vzeroupper=false`
- `-Wl,-mlvm -Wl,-region-vectorize -Wl,-mlllvm -Wl,-function-specialize`
- `-Wl,-mlvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mlvm -Wl,-reduce-array-computations=3 -O3 -march=znver3`
- `-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5`
- `-mlvm -unroll-threshold=50 -mlllvm -inline-threshold=1000`

(Continued on next page)
Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 7313P 16-Core)

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**CPU2017 License:** 9019

**Test Sponsor:** Cisco Systems

**Test Date:** Dec-2021

**Hardware Availability:** Jun-2021

**Tested by:** Cisco Systems

**Software Availability:** Jun-2021

## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, 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`
- `mllvm -enable-partial-unswitch`
- `mllvm -unroll-threshold=100`
- `finline-aggressive`
- `mllvm -loop-unswitch-threshold=200000`
- `mllvm -reroll-loops`
- `mllvm -aggressive-loop-unswitch`
- `mllvm -extra-vectorizer-passes`
- `mllvm -convert-pow-exp-to-int=false`
- `Hz,1,0x1`
- `Mrecursive`
- `mllvm -fuse-tile-inner-loop`
- `funroll-loops`
- `mllvm -lsr-in-nested-loop -z muldefs`
- `DSPEC_OPENMP`
- `fopenmp`
- `fopenmp=libomp`
- `lomp`
- `lamdlibm`
- `ljemalloc`
- `lflang`
- `lflangrti`

## Base Other Flags

C benchmarks:

- `-Wno-unused-command-line-argument`
- `-Wno-return-type`

Fortran benchmarks:

- `-Wno-unused-command-line-argument`
- `-Wno-return-type`

Benchmarks using both Fortran and C:

- `-Wno-unused-command-line-argument`
- `-Wno-return-type`

Benchmarks using Fortran, C, and C++:

- `-Wno-unused-command-line-argument`
- `-Wno-return-type`

## Peak Compiler Invocation

C benchmarks:

- `clang`

Fortran benchmarks:

- `flang`

Benchmarks using both Fortran and C:

- `flang clang`

Benchmarks using Fortran, C, and C++:

- `clang++ clang flang`
Cisco Systems
Cisco UCS C225 M6 (AMD EPYC 7313P 16-Core)

SPECspeed®2017_fp_base = 112
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Test Sponsor: Cisco Systems
Tested by: Cisco Systems
CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems
Test Date: Dec-2021
Hardware Availability: Jun-2021
Software Availability: Jun-2021

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: -m64 -mno-adx -mno-sse4a
-W1,-mllvm -W1,-function-specialize
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-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- vr p
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamlbilm -ljemalloc -lflags

638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes

Fortran benchmarks:
603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes

654.roms_s: -m64 -mno-adx -mno-sse4a
-W1,-mllvm -W1,-enable-X86-prefetching
-W1,-mllvm -W1,-enable-licm-vrp
-W1,-mllvm -W1,-function-specialize
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-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 -lamlbilm
-ljemalloc -lflags

Benchmarks using both Fortran and C:

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Cisco UCS C225 M6 (AMD EPYC 7313P 16-Core)

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

### Peak Optimization Flags (Continued)

- 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

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

You can also download the XML flags sources by saving the following links:
## SPEC CPU®2017 Floating Point Speed Result

**Cisco Systems**

Cisco UCS C225 M6 (AMD EPYC 7313P 16-Core)

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