

## SPEC CPU®2017 Integer Speed Result

### Cisco Systems

Cisco UCS C225 M6 (AMD EPYC 72F3 8-Core)

|---------|------------------------|-----------------------------|--------------------------|-------------------------------|-------------------------------|

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Value (Specspeed)</th>
<th>Value (Specspeed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>8.21</td>
<td>8.22</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>14.9</td>
<td>14.9</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>9.53</td>
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</tr>
<tr>
<td>620.omnetpp_s</td>
<td>16.0</td>
<td>16.0</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>19.3</td>
<td>19.3</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>7.25</td>
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</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>6.52</td>
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<tr>
<td>641.leela_s</td>
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<tr>
<td>648.exchange2_s</td>
<td>26.3</td>
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</tr>
<tr>
<td>657.xz_s</td>
<td>25.0</td>
<td>25.0</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** AMD EPYC 72F3
- **Max MHz:** 4100
- **Nominal:** 3700
- **Enabled:** 8 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:** 256 MB I+D on chip per chip, 32 MB per core
- **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) kernel version 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 72F3 8-Core)

---

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
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<td>247</td>
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</table>

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**Compiler Notes**


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**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)
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Cisco UCS C225 M6 (AMD EPYC 72F3 8-Core)

SPECspeed®2017_int_base = 13.8
SPECspeed®2017_int_peak = 13.9

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

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

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 = "128M"
OMP_THREAD_LIMIT = "16"

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 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 982a61ec0915b55891ef0e16acaf64d

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Copyright 2017-2022 Standard Performance Evaluation Corporation

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Platform Notes (Continued)

running on specsrv Mon Dec  6 19:41:43 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 72F3 8-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 : 8
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7

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: 2
Core(s) per socket: 8
Socket(s): 1
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 72F3 8-Core Processor
Stepping: 1
Frequency boost: enabled
CPU MHz: 1359.180
CPU max MHz: 3700.0000
CPU min MHz: 1500.0000
BogoMIPS: 7386.58
Virtualization: AMD-V
L1d cache: 256 KiB
L1i cache: 256 KiB
L2 cache: 4 MiB
L3 cache: 256 MiB
NUMA node0 CPU(s): 0-3,8-11
NUMA node1 CPU(s): 4-7,12-15
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected

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Platform Notes (Continued)

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 sanitation
Vulnerability Spectre v2: Mitigation; Full AMD retpoline, IBFB conditional, IBRS_FW, STIBF always-on, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected
Flags:

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 32K 256K 8 Data 1 64 1 64
L1i 32K 256K 8 Instruction 1 64 1 64
L2 512K 4M 8 Unified 2 1024 1 64
L3 32M 256M 16 Unified 3 32768 1 64

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

node 0 cpus: 0 1 2 3 8 9 10 11
node 0 size: 515872 MB
node 0 free: 514826 MB
node 1 cpus: 4 5 6 7 12 13 14 15
node 1 size: 516078 MB
node 1 free: 509437 MB
node distances:
node 0: 10 12
1: 10 12

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

From `/proc/meminfo`
- MemTotal: 1056717764 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From `/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor`
- has ondemand

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 specsrv 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/swaps` 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 Dec 6 15:20

SPEC is set to: /home/cpu2017

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sdb2</td>
<td>xfs</td>
<td>223G</td>
<td>27G</td>
<td>197G</td>
<td>12%</td>
<td></td>
</tr>
</tbody>
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<tr>
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<td>13.9</td>
</tr>
</tbody>
</table>

### Platform Notes (Continued)

From /sys/devices/virtual/dmi/id

| Vendor: | Cisco Systems Inc |
| Product: | UCSC-C225-M6S |
| Serial: | W2P2524931G |

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

| 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_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++

| 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_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

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

Fortran

| 648.exchange2_s(base, peak) |

(Continued on next page)
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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

Base Portability Flags

600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LINUX -DSPEC_LP64
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -mno-adx -mno-sse4a -W1,-allow-multiple-definition
-W1,-mlvm -W1,-enable-lincm-vrp -W1,-mlvm -W1,-region-vectorize
-W1,-mlvm -W1,-function-specialize
-W1,-mlvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5

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Base Optimization Flags (Continued)

C benchmarks (continued):
-mlvm -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-lcm-vrp -mllvm -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-mlvm -mllvm -W1,-do-block-reorder=aggressive
-mlvm -mllvm -W1,-region-vectorize -W1,-mllvm -W1,-function-specialize
-mlvm -mllvm -W1,-align-all-nofallthru-blocks=6
-mlvm -mllvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroiloops -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 -mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
-lflangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -W1,-mllvm -W1,-inline-recursion=4
-mlvm -mllvm -W1,-lsr-in-nested-loop -W1,-mllvm -W1,-enable-iv-split
-mlvm -mllvm -W1,-region-vectorize -W1,-mllvm -W1,-function-specialize
-mlvm -mllvm -W1,-align-all-nofallthru-blocks=6
-mlvm -mllvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -z muldefs
-mlvm -unroll-aggressive -mllvm -unroll-threshold=150 -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
-lflangrti

Base Other Flags

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

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

(Continued on next page)
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### Base Other Flags (Continued)

- Fortran benchmarks:
  - -Wno-return-type

### Peak Compiler Invocation

- C benchmarks:
  - `clang`
- C++ benchmarks:
  - `clang++`
- Fortran benchmarks:
  - `flang`

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

- C benchmarks:
  - `600.perlbench_s: -m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition`
  - `-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`
  - `602.gcc_s: Same as 600.perlbench_s`
  - `605.mcf_s: Same as 600.perlbench_s`

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SPEC CPU®2017 Integer Speed Result
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SPECspeed®2017_int_base = 13.8
SPECspeed®2017_int_peak = 13.9

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

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

Peak Optimization Flags (Continued)

625.x264_s: Same as 600.perlbench_s
657.xz_s: basepeak = yes

C++ benchmarks:
620.omnetpp_s: basepeak = yes
623.xalancbmk_s: basepeak = yes
631.deepsjeng_s: basepeak = yes
641.leela_s: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-ml1vm -Wl,-do-block-reorder=aggressive
-Wl,-ml1vm -Wl,-function-specialize
-Wl,-ml1vm -Wl,-align-all-nofallthru-blocks=6
-Wl,-ml1vm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -flto
-finline-aggressive -ml1vm -unroll-threshold=100
-fvl-function-specialization -ml1vm -enable-licm-vrp
-ml1vm -reroll-loops -ml1vm -aggressive-loop-unswitch
-ml1vm -reduce-array-computations=3
-ml1vm -global-vectorize-slp=true
-ml1vm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-llvm -ljemalloc -lflang

Fortran benchmarks:
648.exchange2_s: basepeak = yes

Peak Other Flags

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

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

Fortran benchmarks:
-Wno-return-type
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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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Tested with SPEC CPU®2017 v1.1.8 on 2021-12-06 22:41:42-0500.
Originally published on 2022-01-04.