



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

## Cisco Systems

Cisco UCS X210c M6 (Intel Xeon Gold 6354,  
3.00GHz)

**SPECrate®2017\_fp\_base = 329**

**SPECrate®2017\_fp\_peak = Not Run**

**CPU2017 License:** 9019

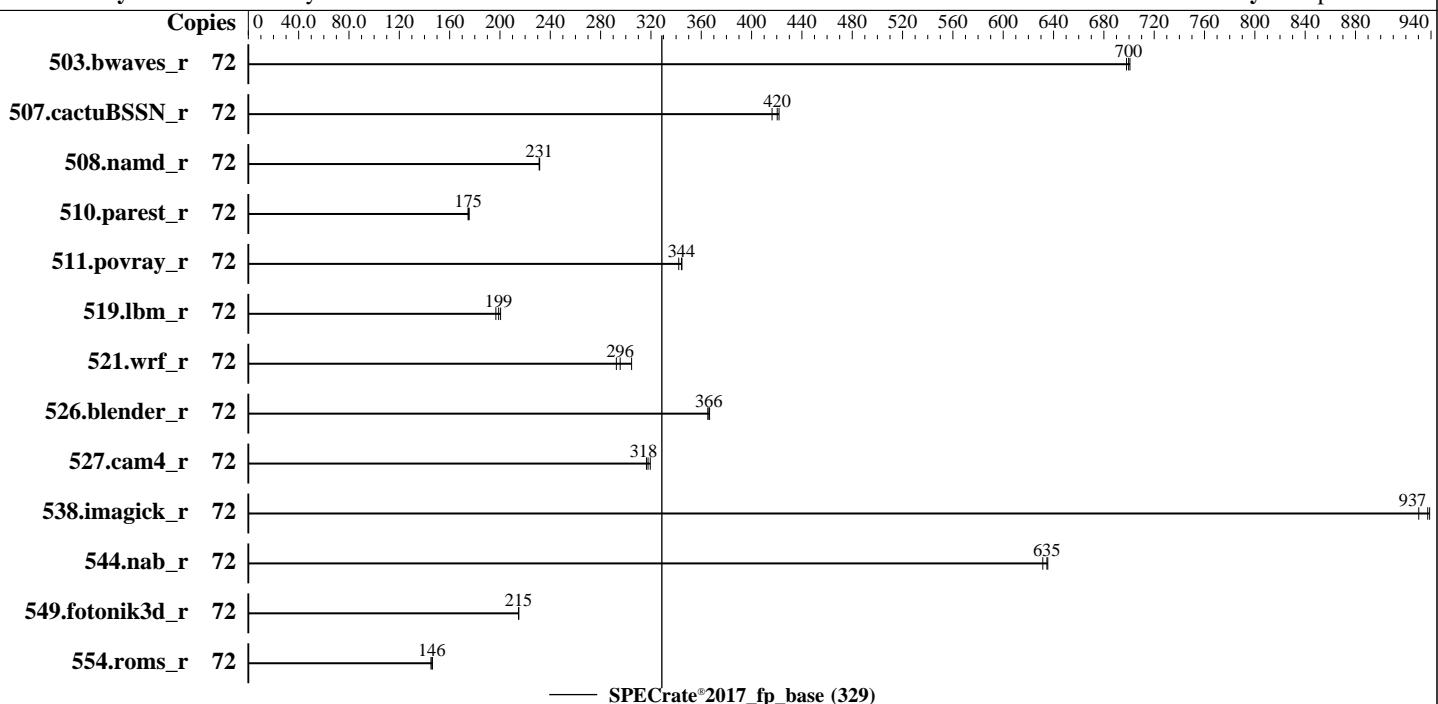
**Test Sponsor:** Cisco Systems

**Tested by:** Cisco Systems

**Test Date:** Dec-2021

**Hardware Availability:** Sep-2021

**Software Availability:** Sep-2021



### Hardware

CPU Name: Intel Xeon Gold 6354  
 Max MHz: 3600  
 Nominal: 3000  
 Enabled: 36 cores, 2 chips, 2 threads/core  
 Orderable: 1,2 Chips  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 1.25 MB I+D on chip per core  
 L3: 39 MB I+D on chip per chip  
 Other: None  
 Memory: 2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R)  
 Storage: 1 x 240 GB M.2 SSD SATA  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 SP3  
 5.3.18-57-default  
 Compiler: C/C++: Version 2021.4.0 of Intel oneAPI DPC++/C++ Compiler Build 20210924 for Linux;  
 Fortran: Version 2021.4.0 of Intel Fortran Compiler  
 Classic Build 20210910 for Linux;  
 Parallel: No  
 Firmware: Version 5.0.1d released Aug-2021  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 Other: jemalloc memory allocator V5.0.1  
 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							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	72	1034	698	1030	701	<b>1032</b>	<b>700</b>									
507.cactubSSN_r	72	<b>217</b>	<b>420</b>	216	422	219	416									
508.namd_r	72	295	232	296	231	<b>296</b>	<b>231</b>									
510.parest_r	72	<b>1077</b>	<b>175</b>	1078	175	1073	176									
511.povray_r	72	491	342	<b>488</b>	<b>344</b>	488	345									
519.lbm_r	72	<b>381</b>	<b>199</b>	386	197	378	201									
521.wrf_r	72	<b>546</b>	<b>296</b>	551	293	529	305									
526.blender_r	72	299	367	<b>300</b>	<b>366</b>	300	365									
527.cam4_r	72	394	319	<b>396</b>	<b>318</b>	398	316									
538.imagick_r	72	191	939	<b>191</b>	<b>937</b>	192	930									
544.nab_r	72	191	635	192	631	<b>191</b>	<b>635</b>									
549.fotonik3d_r	72	1307	215	1305	215	<b>1306</b>	<b>215</b>									
554.roms_r	72	<b>784</b>	<b>146</b>	788	145	782	146									

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"  
MALLOC\_CONF = "retain:true"

## General Notes

Binaries compiled on a system with 1x Intel Core i9-7940X CPU + 64GB RAM  
memory using openSUSE Leap 15.2  
Transparent Huge Pages enabled by default  
Prior to runcpu invocation  
Filesystem page cache synced and cleared with:

(Continued on next page)



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## General Notes (Continued)

```
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
```

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, a general purpose malloc implementation  
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  
sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

## Platform Notes

BIOS Settings:

Adjacent Cache Line Prefetcher set to Disabled

DCU Streamer Prefetch set to Disabled

Sub NUMA Clustering set to Enabled

LLC Dead Line set to Disabled

Memory Refresh Rate set to 1x Refresh

ADDDC Sparing set to Disabled

Patrol Scrub set to Disabled

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on perf-bladel Mon Dec 6 01:31:12 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 : Intel(R) Xeon(R) Gold 6354 CPU @ 3.00GHz
  2 "physical id"s (chips)
  72 "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 : 18
  siblings   : 36
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
```

From lscpu from util-linux 2.36.2:

Architecture:	x86_64
CPU op-mode(s):	32-bit, 64-bit

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## Platform Notes (Continued)

Byte Order:	Little Endian
Address sizes:	46 bits physical, 57 bits virtual
CPU(s):	72
On-line CPU(s) list:	0-71
Thread(s) per core:	2
Core(s) per socket:	18
Socket(s):	2
NUMA node(s):	4
Vendor ID:	GenuineIntel
CPU family:	6
Model:	106
Model name:	Intel(R) Xeon(R) Gold 6354 CPU @ 3.00GHz
Stepping:	6
CPU MHz:	1665.621
CPU max MHz:	3600.0000
CPU min MHz:	800.0000
BogoMIPS:	6000.00
Virtualization:	VT-x
L1d cache:	1.7 MiB
L1i cache:	1.1 MiB
L2 cache:	45 MiB
L3 cache:	78 MiB
NUMA node0 CPU(s):	0-8,36-44
NUMA node1 CPU(s):	9-17,45-53
NUMA node2 CPU(s):	18-26,54-62
NUMA node3 CPU(s):	27-35,63-71
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/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2:	Mitigation; Enhanced IBRS, IBPB conditional, 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 dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtTopology nonstop_tsc cpuid aperf mperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_13 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb

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## Platform Notes (Continued)

```
intel_pt avx512cd sha_ni avx512bw avx512vl xsavect xgetbv1 xsaves cqmm_llc
cqmm_occup_llc cqmm_mbm_total cqmm_mbm_local split_lock_detect wbnoinvd dtherm ida arat
pln pts hwp hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku ospke
avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq
la57 rdpid fsrm md_clear pconfig flush_ll1d arch_capabilities
```

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	48K	1.7M	12	Data	1	64	1	64
L1i	32K	1.1M	8	Instruction	1	64	1	64
L2	1.3M	45M	20	Unified	2	1024	1	64
L3	39M	78M	12	Unified	3	53248	1	64

/proc/cpuinfo cache data  
cache size : 39936 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 4 5 6 7 8 36 37 38 39 40 41 42 43 44

node 0 size: 515685 MB

node 0 free: 515050 MB

node 1 cpus: 9 10 11 12 13 14 15 16 17 45 46 47 48 49 50 51 52 53

node 1 size: 516091 MB

node 1 free: 515533 MB

node 2 cpus: 18 19 20 21 22 23 24 25 26 54 55 56 57 58 59 60 61 62

node 2 size: 516091 MB

node 2 free: 515546 MB

node 3 cpus: 27 28 29 30 31 32 33 34 35 63 64 65 66 67 68 69 70 71

node 3 size: 516053 MB

node 3 free: 515433 MB

node distances:

node 0 1 2 3

0: 10 11 20 20

1: 11 10 20 20

2: 20 20 10 11

3: 20 20 11 10

From /proc/meminfo

MemTotal: 2113455436 kB

HugePages\_Total: 0

Hugepagesize: 2048 kB

/sys/devices/system/cpu/cpu\*/cpufreq/scaling\_governor has  
performance

From /etc/\*release\* /etc/\*version\*

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## Platform Notes (Continued)

```
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 perf-blade1 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: Enhanced IBRS, IBPB: 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 5 22:11

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda3	xfs	181G	54G	128G	30%	/home

```
From /sys/devices/virtual/dmi/id  
  Vendor: Cisco Systems Inc  
  Product: UCSX-210C-M6  
  Serial: FCH25057AMV
```

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:

(Continued on next page)



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## Platform Notes (Continued)

32x 0xCE00 M393A8G40AB2-CWE 64 GB 2 rank 3200

BIOS:

BIOS Vendor: Cisco Systems, Inc.  
BIOS Version: X210M6.5.0.1d.0.0816211754  
BIOS Date: 08/16/2021  
BIOS Revision: 5.22

(End of data from sysinfo program)

## Compiler Version Notes

```
=====
C           | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
-----
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.4.0 Build 20210924
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.
-----

=====
C++          | 508.namd_r(base) 510.parest_r(base)
-----
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.4.0 Build 20210924
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.
-----

=====
C++, C       | 511.povray_r(base) 526.blender_r(base)
-----
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.4.0 Build 20210924
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.4.0 Build 20210924
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.
-----

=====
C++, C, Fortran | 507.cactuBSSN_r(base)
-----
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.4.0 Build 20210924
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
```

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## Compiler Version Notes (Continued)

Version 2021.4.0 Build 20210924

Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on

Intel(R) 64, Version 2021.4.0 Build 20210910\_000000

Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

---

=====

Fortran | 503.bwaves\_r(base) 549.fotonik3d\_r(base) 554.roms\_r(base)

---

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on

Intel(R) 64, Version 2021.4.0 Build 20210910\_000000

Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

---

=====

Fortran, C | 521.wrf\_r(base) 527.cam4\_r(base)

---

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on

Intel(R) 64, Version 2021.4.0 Build 20210910\_000000

Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.4.0 Build 20210924

Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

---

## Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icx

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifort



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## 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\_LP64 -DSPEC\_CASE\_FLAG -convert big\_endian  
526.blender\_r: -DSPEC\_LP64 -DSPEC\_LINUX -funsigned-char  
527.cam4\_r: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG  
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:

```
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc -L/home/cpu2017/je5.0.1-64
```

C++ benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc -L/home/cpu2017/je5.0.1-64
```

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-mbranches-within-32B-boundaries -ljemalloc -L/home/cpu2017/je5.0.1-64
```

Benchmarks using both Fortran and C:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -ljemalloc -L/home/cpu2017/je5.0.1-64
```

Benchmarks using both C and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
```

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## Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):

```
-mbranches-within-32B-boundaries -ljemalloc -L/home/cpu2017/je5.0.1-64
```

Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -ljemalloc -L/home/cpu2017/je5.0.1-64
```

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

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.2021-12-22.html](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.2021-12-22.html)  
<http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.0-ICX-revJ.html>

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

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.2021-12-22.xml](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.2021-12-22.xml)  
<http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.0-ICX-revJ.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

Tested with SPEC CPU®2017 v1.1.8 on 2021-12-06 04:31:11-0500.

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