Cisco Systems
Cisco UCS C220 M6 (Intel Xeon Gold 6338N, 2.20GHz)

SPECrater®2017_int_base = 412
SPECrater®2017_int_peak = 429

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
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<tbody>
<tr>
<td>OS: SUSE Linux Enterprise Server 15 SP2, 5.3.18-22-default</td>
<td>CPU Name: Intel Xeon Gold 6338N</td>
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<tr>
<td>Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux; C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux</td>
<td>Max MHz: 3500</td>
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<tr>
<td>Firmware: Version 4.2.1d released Jul-2021</td>
<td>Nominal: 2200</td>
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<tr>
<td>File System: btrfs</td>
<td>Enabled: 64 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>Orderable: 1,2 Chips</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
<td>Cache L1: 32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td>Peak Pointers: 32/64-bit</td>
<td>L2: 1.25 MB I+D on chip per core</td>
</tr>
<tr>
<td>Other: jemalloc memory allocator V5.0.1</td>
<td>L3: 48 MB I+D on chip per chip</td>
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<tr>
<td>Power Management: BIOS and OS set to prefer performance at the cost of additional power usage</td>
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CPU2017 License: 9019
Test Sponsor: Cisco Systems
Test Date: Aug-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020
Tested by: Cisco Systems
Software Availability: Dec-2020
Cisco Systems
Cisco UCS C220 M6 (Intel Xeon Gold 6338N, 2.20GHz)

Results Table

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</tbody>
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SPECrate®2017_int_base = 412
SPECrate®2017_int_peak = 429

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/lib/ia32:/home/cpu2017/je5.0.1-32"

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:
sync; echo 3> /proc/sys/vm/drop_caches

(Continued on next page)
**SPEC CPU®2017 Integer Rate Result**

**Cisco Systems**
Cisco UCS C220 M6 (Intel Xeon Gold 6338N, 2.20GHz)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
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<tr>
<td>412</td>
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**CPU2017 License:** 9019
**Test Sponsor:** Cisco Systems
**Tested by:** Cisco Systems

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<th>Test Date:</th>
<th>Hardware Availability:</th>
<th>Software Availability:</th>
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<tbody>
<tr>
<td>Aug-2021</td>
<td>Jun-2021</td>
<td>Dec-2020</td>
</tr>
</tbody>
</table>

**General Notes (Continued)**

```bash
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.


**Platform Notes**

**BIOS Settings:**
- Adjacent Cache Line Prefetcher set to Disabled
- DCU Streamer Prefetch set to Disabled
- UPI Link Enablement set to 1
- UPI Power Management set to Enabled
- 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
- Energy Efficient Turbo set to Enabled
- Processor C6 Report set to Enabled
- Processor C1E set to Enabled

Sysinfo program `/home/cpu2017/bin/sysinfo`
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on localhost Sat Aug 28 07:48:31 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`
```bash
model name : Intel(R) Xeon(R) Gold 6338N CPU @ 2.20GHz
  2 "physical id"s (chips)
  128 "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 : 32
siblings : 64
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
```
Cisco Systems
Cisco UCS C220 M6 (Intel Xeon Gold 6338N, 2.20GHz)

**SPEC CPU®2017 Integer Rate Result**

**SPECrate®2017_int_base = 412**

**SPECrate®2017_int_peak = 429**

---

**CPU2017 License:** 9019  
**Test Sponsor:** Cisco Systems  
**Tested by:** Cisco Systems  
**Test Date:** Aug-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Dec-2020

---

### Platform Notes (Continued)

From `lscpu` from util-linux 2.33.1:

- **Architecture:** x86_64
- **CPU op-mode(s):** 32-bit, 64-bit
- **Byte Order:** Little Endian
- **Address sizes:** 46 bits physical, 57 bits virtual
- **CPU(s):** 128
- **On-line CPU(s) list:** 0-127
- **Thread(s) per core:** 2
- **Core(s) per socket:** 32
- **Socket(s):** 2
- **NUMA node(s):** 4
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 106
- **Model name:** Intel(R) Xeon(R) Gold 6338N CPU @ 2.20GHz
- **Stepping:** 6
- **CPU MHz:** 800.109
- **CPU max MHz:** 3500.0000
- **CPU min MHz:** 800.0000
- **BogoMIPS:** 440.00
- **Virtualization:** VT-x
- **L1d cache:** 48K
- **L1i cache:** 32K
- **L2 cache:** 1280K
- **L3 cache:** 49152K
- **NUMA node0 CPU(s):** 0-15, 64-79
- **NUMA node1 CPU(s):** 16-31, 80-95
- **NUMA node2 CPU(s):** 32-47, 96-111
- **NUMA node3 CPU(s):** 48-63, 112-127

**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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid  
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16  
xtrn 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 ibbp ibrs enhancement 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 intel_pt avx512cd sha_ni  
avx512bw avx512vl xsaveopt xsavec xsavec xsavec xsavec cqm_llc cqm_occup_llc cqm_mbm_total  
cqm_mbm_local wbnoinvd dtherm ida arat pln pts hwp hwp_act_window hwp_epp  
hwp_kkg_rex avx512vmbmi umip pku ospke avx512_vmbmi2 gfnl vaes vpcmcmdq avx512_vnni  
avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lid  
arsh_capabilities
```

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

```
/proc/cpufinfo cache data
  cache size : 49152 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 9 10 11 12 13 14 15 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  node 0 size: 257528 MB
  node 0 free: 257069 MB
  node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
  node 1 size: 258040 MB
  node 1 free: 257673 MB
  node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111
  node 2 size: 257674 MB
  node 2 free: 257674 MB
  node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127
  node 3 size: 257762 MB
  node 3 free: 257301 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: 1056124172 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-SP2"
    VERSION_ID="15.2"
    PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
    ID="sles"
    ID_LIKE="suse"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:15:sp2"
```
SPEC CPU®2017 Integer Rate Result

Cisco Systems
Cisco UCS C220 M6 (Intel Xeon Gold 6338N, 2.20GHz)

---

SPECrate®2017_int_base = 412
SPECrate®2017_int_peak = 429

---

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Test Date: Aug-2021
Hardware Availability: Jun-2021
Tested by: Cisco Systems
Software Availability: Dec-2020

Platform Notes (Continued)

uname -a:
    Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) 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 sanitation
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 Aug 28 07:44

SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 btrfs 222G 34G 188G 16% /home

From /sys/devices/virtual/dmi/id
Vendor: Cisco Systems Inc
Product: UCSC-C220-M6S
Serial: WZP24430N7F

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 SMI BIOS" standard.

Memory:
    32x 0xCE00 M393A4K40DB3-CWE 32 GB 2 rank 3200, configured at 2666

BIOS:
    BIOS Vendor: Cisco Systems, Inc.
    BIOS Version: C220M6.4.2.id.0.0730210924
    BIOS Date: 07/30/2021
    BIOS Revision: 5.22

(End of data from sysinfo program)
## Compiler Version Notes

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<tr>
<td>Copyright (C) 1985-2020 Intel Corporation. All rights reserved.</td>
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<th>505.mcf_r(base, peak)</th>
<th>525.x264_r(base, peak)</th>
<th>557.xz_r(base)</th>
</tr>
</thead>
<tbody>
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<td>__________________________________________________________</td>
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<tr>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113</td>
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</table>

(Continued on next page)
# SPEC CPU® 2017 Integer Rate Result

## Cisco Systems

**Cisco UCS C220 M6** (Intel Xeon Gold 6338N, 2.20GHz)

<table>
<thead>
<tr>
<th>SPECrate® 2017 int_base</th>
<th>412</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate® 2017 int_peak</td>
<td>429</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9019  
**Test Sponsor:** Cisco Systems  
** Tested by:** Cisco Systems  
**Hardware Availability:** Jun-2021  
**Software Availability:** Dec-2020

**Test Date:** Aug-2021

---

## Compiler Version Notes (Continued)

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<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(peak) 557.xz_r(peak)</th>
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| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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<table>
<thead>
<tr>
<th>C</th>
<th>502.gcc_r(peak)</th>
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</table>
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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| C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)  
<table>
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<tr>
<th></th>
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<td>525.x264_r(base, peak) 557.xz_r(base)</td>
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| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

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| C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)  
<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>531.deepsjeng_r(base, peak) 541.leela_r(base, peak)</td>
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<table>
<thead>
<tr>
<th>Fortran</th>
<th>548.exchange2_r(base, peak)</th>
</tr>
</thead>
</table>
| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
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Cisco Systems
Cisco UCS C220 M6 (Intel Xeon Gold 6338N, 2.20GHz)

SPECrate®2017_int_base = 412
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CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems

Test Date: Aug-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

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Software Availability: Dec-2020

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icx
500.perlbench_r: icc
557.xz_r: icc
C++ benchmarks:
icpx
Fortran benchmarks:
ifort

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:
500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries

(Continued on next page)
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**Peak Optimization Flags (Continued)**

500.perlbench_r (continued):
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -gopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes
525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-03 -ffast-math -gopt-mem-layout-trans=4 -fno-alias
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -03 -no-prec-div
-gopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
520.omnetpp_r: basepeak = yes
523.xalancbmk_r: basepeak = yes
531.deepsjeng_r: basepeak = yes
541.leela_r: basepeak = yes

Fortran benchmarks:
548.exchange2_r: basepeak = yes

---

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:

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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