## SPEC CPU®2017 Integer Speed Result

**Dell Inc.**

PowerEdge R750 (Intel Xeon Platinum 8351N, 2.40 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.7</td>
<td>12.0</td>
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</table>

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Apr-2021  
**Hardware Availability:** May-2021  
**Software Availability:** Feb-2021

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
  4.18.0-240.15.1.el8_3.x86_64
- **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
- **Parallel:** Yes
- **Firmware:** Version 1.1.2 released Apr-2021
- **File System:** tmpfs
- **System State:** Run level 5 (graphical multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.

### Hardware

- **CPU Name:** Intel Xeon Platinum 8351N
- **Max MHz:** 3500
- **Nominal:** 2400
- **Enabled:** 36 cores, 1 chip
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **L2:** 1.25 MB I+D on chip per core
- **L3:** 54 MB I+D on chip per chip
- **Other:** None
- **Memory:** 256 GB (8 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)
- **Storage:** 225 GB on tmpfs
- **Other:** None

### Benchmark Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
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</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>36</td>
<td>7.21 (22.0)</td>
<td>8.32 (21.8)</td>
</tr>
<tr>
<td>gcc</td>
<td>36</td>
<td>11.0 (20.6)</td>
<td>11.4</td>
</tr>
<tr>
<td>mcf</td>
<td>36</td>
<td></td>
<td></td>
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<tr>
<td>omnetpp</td>
<td>36</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>xalancbmk</td>
<td>36</td>
<td></td>
<td>13.6</td>
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<tr>
<td>x264</td>
<td>36</td>
<td></td>
<td>17.1</td>
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<tr>
<td>deepsjeng</td>
<td>36</td>
<td>5.93</td>
<td>17.8</td>
</tr>
<tr>
<td>leela</td>
<td>36</td>
<td>4.86</td>
<td></td>
</tr>
<tr>
<td>exchange2</td>
<td>36</td>
<td></td>
<td>19.4</td>
</tr>
<tr>
<td>xz</td>
<td>36</td>
<td></td>
<td>21.8</td>
</tr>
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**Notes:**
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Results Table

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<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>36</td>
<td>245</td>
<td>7.24</td>
<td>246</td>
<td>7.21</td>
<td>246</td>
<td>7.21</td>
<td>36</td>
<td>213</td>
<td>8.35</td>
<td>213</td>
<td>8.32</td>
<td>214</td>
<td>8.31</td>
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<tr>
<td>602.gcc_s</td>
<td>36</td>
<td>363</td>
<td>11.0</td>
<td>366</td>
<td>10.9</td>
<td>361</td>
<td>11.0</td>
<td>36</td>
<td>348</td>
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<td>348</td>
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<td>11.0</td>
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<td>11.0</td>
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<tr>
<td>620.omnetpp_s</td>
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<td>152</td>
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<td>155</td>
<td>10.5</td>
<td>155</td>
<td>10.5</td>
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<td>152</td>
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<td>155</td>
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<td>10.5</td>
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<td>104</td>
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<td>13.6</td>
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<td>13.6</td>
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<td>103</td>
<td>17.1</td>
<td>103</td>
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<td>241</td>
<td>5.94</td>
<td>242</td>
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<td>5.93</td>
<td>242</td>
<td>5.93</td>
</tr>
<tr>
<td>641.leela_s</td>
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<td>351</td>
<td>4.86</td>
<td>351</td>
<td>4.86</td>
<td>351</td>
<td>4.86</td>
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<td>4.86</td>
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<td>648.exchange2_s</td>
<td>36</td>
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<td>19.4</td>
<td>152</td>
<td>19.4</td>
<td>152</td>
<td>19.4</td>
<td>36</td>
<td>152</td>
<td>19.4</td>
<td>152</td>
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<td>152</td>
<td>19.4</td>
</tr>
</tbody>
</table>

SPECspeed®2017_int_base = 11.7
SPECspeed®2017_int_peak = 12.0

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

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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesysten page cache synced and cleared with:
sync; echo 3>/proc/sys/vm/drop_caches
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)
General Notes (Continued)

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.

Benchmark run from a 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

Platform Notes

BIOS Settings:
Logical Processor : Disabled
Virtualization Technology : Disabled
System Profile : Custom
CPU Power Management : Maximum Performance
C1E : Disabled
C States : Autonomous
Memory Patrol Scrub : Disabled
Energy Efficiency Policy : Performance
CPU Interconnect Bus Link
Power Management : Disabled

Sysinfo program /mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7b80af8a89e2f8c
running on localhost.localdomain Tue Apr 13 10:18:23 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) Platinum 8351N CPU @ 2.40GHz
  1 "physical id"s (chips)
  36 "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 : 36
siblings : 36
physical 0: cores 0 1 2 3 4 5 6 7 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35

From lscpu:
Architecture: x86_64

(Continued on next page)
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CPU2017 License: 55
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CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 36
On-line CPU(s) list: 0-35
Thread(s) per core: 1
Core(s) per socket: 36
Socket(s): 1
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8351N CPU @ 2.40GHz
Stepping: 6
CPU MHz: 2993.447
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 55296K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35
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
xtr sneakers pdcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single
intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced fs.gsbase tsc_adjust bmi1 hle avx2
smep bmi2 erms invpcid cmq rdt_a avx512f avx512dq rdseed adx smap avx512ifma
clflushopt clwb intel_pt avx512cd sha_hni avx512bw avx512vl xsaveopt xsave xsetbv	
xsaves cmq_llc cmq_occoup_llc cmq_mbm_total cmq_mbm_local split_lock_detect wbinvd
dtherm ida arat pni pts avx512vmbi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq
avx512_vnni avx512_vbitalg tme avx512 vpopcntdq la57 rdpid md_clear pconfig flush_l1d
arch_capabilities

/proc/cpuinfo cache data
cache size : 55296 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34
node 0 size: 126199 MB
node 0 free: 112973 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35
node 1 size: 126883 MB

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Hardware Availability: May-2021
Software Availability: Feb-2021

Platform Notes (Continued)

node 1 free: 127206 MB
node distances:
node 0 1
 0: 10 11
 1: 11 10

From /proc/meminfo
  MemTotal: 263573864 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

/sbin/tuned-adm active
  Current active profile: throughput-performance

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux"
    VERSION="8.3 (Ootpa)"
    ID="rhe1"
    ID_LIKE="fedora"
    VERSION_ID="8.3"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
    ANSI_COLOR="0;31"
  redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
  system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
  Linux localhost.localdomain 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST 2021 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): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2): Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected

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

CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Apr 13 10:14

SPECl is set to: /mnt/ramdisk2/cpu2017-1.1.5-ic2021.1

Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 225G 6.9G 219G 4% /mnt/ramdisk2

From /sys/devices/virtual/dmi/id

Vendor: Dell Inc.
Product: PowerEdge R750
Product Family: PowerEdge
Serial: 1234567

Additional information from dmidecode 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:

5x 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2933
3x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200, configured at 2933
24x Not Specified Not Specified

BIOS:

BIOS Vendor: Dell Inc.
BIOS Version: 1.1.2
BIOS Date: 04/09/2021
BIOS Revision: 1.1

(End of data from sysinfo program)

---

** Compiler Version Notes **

==============================================================================
C | 600.perlbench_s(peak)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------

==============================================================================
C | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
| 625.x264_s(base, peak) 657.xz_s(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,

(Continued on next page)
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Compiler Version Notes (Continued)

Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---------------------------------------------------------------------
C       | 600.perlbench_s(peak)
---------------------------------------------------------------------

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.

---------------------------------------------------------------------
C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak)
---------------------------------------------------------------------

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.

---------------------------------------------------------------------
C++      | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)
---------------------------------------------------------------------

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.

---------------------------------------------------------------------
Fortran  | 648.exchange2_s(base, peak)
---------------------------------------------------------------------

Intel(R) Fortran 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.

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

(Continued on next page)
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Fortran benchmarks:
ifort

Base Compiler Invocation (Continued)

Base Portability Flags

\begin{itemize}
\item 600.perlbench\_s: -DSPEC\_LP64 -DSPEC\_LINUX\_X64
\item 602.gcc\_s: -DSPEC\_LP64
\item 605.mcf\_s: -DSPEC\_LP64
\item 620.omnetpp\_s: -DSPEC\_LP64
\item 623.xalancbmk\_s: -DSPEC\_LP64 -DSPEC\_LINUX
\item 625.x264\_s: -DSPEC\_LP64
\item 631.deepsjeng\_s: -DSPEC\_LP64
\item 641.leela\_s: -DSPEC\_LP64
\item 648.exchange2\_s: -DSPEC\_LP64
\item 657.xz\_s: -DSPEC\_LP64
\end{itemize}

Base Optimization Flags

C benchmarks:
-DSPEC\_OPENMP -std=c11 -m64 -fiopenmp \(-Wl,-z,muldefs -xCORE-AVX512 \-O3 -ffast-math -fllto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-DSPEC\_OPENMP -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-fllto -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:
-m64 -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries

Peak Compiler Invocation

C benchmarks (except as noted below):
icx
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</table>

### Peak Compiler Invocation (Continued)

```
600.perlbench_s: icc

C++ benchmarks:
icpx

Fortran benchmarks:
ifort
```

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

**C benchmarks:**

```
600.perlbench_s: -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  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

```
602.gcc_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)  
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto  
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

```
605.mcf_s: basepeak = yes
```

```
625.x264_s: -DSPEC_OPENMP -fiopenmp -std=c11 -m64 -Wl,-z,muldefs  
-xCORE-AVX512 -flto -O3 -ffast-math  
-qopt-mem-layout-trans=4 -fno-alias  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

```
657.xz_s: basepeak = yes
```

**C++ benchmarks:**

(Continued on next page)
Dell Inc.
PowerEdge R750 (Intel Xeon Platinum 8351N, 2.40 GHz)

SPEC CPU®2017 Integer Speed Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.
GHz)

SPECspeed®2017_int_base = 11.7
SPECspeed®2017_int_peak = 12.0

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Apr-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

Peak Optimization Flags (Continued)

620.omnetpp_s: basepeak = yes
623.xalancbmk_s: basepeak = yes
631.deepsjeng_s: basepeak = yes
641.leela_s: basepeak = yes

Fortran benchmarks:
648.exchange2_s: 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.

Tested with SPEC CPU®2017 v1.1.5 on 2021-04-13 11:18:22-0400.
Originally published on 2021-05-18.