**SPEC CPU®2017 Integer Speed Result**

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**Lenovo Global Technology**  
ThinkSystem SR670 V2  
(2.60 GHz, Intel Xeon Platinum 8358)

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**SPECspeed®2017_int_base = 12.2**  
**SPECspeed®2017_int_peak = 12.4**

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Mar-2023  
**Hardware Availability:** Jul-2021  
**Software Availability:** Dec-2022

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### Hardware

- **CPU Name:** Intel Xeon Platinum 8358  
- **Max MHz:** 3400  
- **Nominal:** 2600  
- **Enabled:** 64 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:** 48 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

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### Software

- **OS:** Red Hat Enterprise Linux 9.1 (Plow) (x86_64)  
- **Kernel:** 5.14.0-162.6.1.el9_1.x86_64  
- **Compiler:** C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux;  
  Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;  
- **Parallel:** Yes  
- **Firmware:** Lenovo BIOS Version U8E121H 1.50 released Feb-2023  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **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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### Threads

<table>
<thead>
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<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
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<td>xz_s</td>
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</table>

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### Additional Details
- **Orderable:** 1, 2 chips
- **Other:** None
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
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</tr>
</tbody>
</table>

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

Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalanchmk_r / 623.xalanchmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

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 = "'/home/cpu2017-1.1.9-ic2023.0/lib/intel64:/home/cpu2017-1.1.9-ic2023.0/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Redhat Enterprise Linux 8.0
Transparent Huge Pages enabled by default
Prior to runcpu invocation

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General Notes (Continued)

Filesystem page cache synced and cleared with:
 sync; echo 3 > /proc/sys/vm/drop_caches
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

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
C-States set to Legacy

Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c88b7ed5c36ae2c92ce097bec197
running on localhost.localdomain Thu Mar  9 14:50:56 2023

SUT (System Under Test) info as seen by some common utilities.

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7. lscpu
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10. who -r
11. Systemd service manager version: systemd 250 (250-12.el9_1)
12. Failed units, from systemctl list-units --state=failed
13. Services, from systemctl list-unit-files
14. Linux kernel boot-time arguments, from /proc/cmdline
15. cpupower frequency-info
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
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23. BIOS

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Platform Notes (Continued)

14:50:56 up 4 min, 1 user, load average: 0.30, 2.20, 1.31
USER TTY LOGIN@ IDLE JCPU PCPU WHAT
root tty1 14:49 28.00s 1.10s 0.00s -bash

3. Username
From environment variable $USER: root

4. ulimit -a
real-time non-blocking time (microseconds, -R) unlimited
core file size (blocks, -c) 0
data seg size (kbytes, -d) unlimited
scheduling priority (-e) 0
file size (blocks, -f) unlimited
pending signals (-i) 4126644
max locked memory (kbytes, -l) 64
max memory size (kbytes, -m) unlimited
open files (-n) 1024
pipe size (512 bytes, -p) 8
POSIX message queues (bytes, -q) 819200
real-time priority (-r) 0
stack size (kbytes, -s) unlimited
cpu time (seconds, -t) unlimited
max user processes (-u) 4126644
virtual memory (kbytes, -v) unlimited
file locks (-x) unlimited

5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
-bash
runcpu --nobuild --action validate --define default-platform-flags --c
ic2023.0-lin-core-avx512-speed-20221201.cfg --define cores=64 --tune base,peak -o all --define
intspeedaffinity --define smt-on --define drop_caches intspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
ic2023.0-lin-core-avx512-speed-20221201.cfg --define cores=64 --tune base,peak --output_format all
--define intspeedaffinity --define smt-on --define drop_caches --nopower --runmode speed --tune base:peak
--size refspeed intspeed --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.004/templogs/preenv.intspeed.004.0.log --lognum 004.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2023.0

6. /proc/cpuinfo
model name: Intel(R) Xeon(R) Platinum 8358 CPU @ 2.60GHz
vendor_id: GenuineIntel
cpu family: 6
model: 106
stepping: 6
microcode: 0xd000389
bugs: spectre_v1 spectre_v2 spec_store_bypass swapgs mmio_stale_data eibrs_pbrsb
cpu cores: 32
siblings: 64
2 physical ids (chips)
128 processors (hardware threads)
physical id 0: core ids 0-31
physical id 1: core ids 0-31

(Continued on next page)
Platform Notes (Continued)

physical id 0: apicid 0-63
physical id 1: apicid 128-191
Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

7. lscpu

From lscpu from util-linux 2.37.4:

---

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 46 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 128
On-line CPU(s) list: 0-127
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel(R) Corporation
Model name: Intel(R) Xeon(R) Platinum 8358 CPU @ 2.60GHz
BIOS Model name: Intel(R) Xeon(R) Platinum 8358 CPU @ 2.60GHz
CPU family: 6
Model: 106
Thread(s) per core: 2
Core(s) per socket: 32
System: 6
CPU max MHz: 3400.000
CPU min MHz: 800.0000
BogoMIPS: 5200.00
Flags: fpu vme de pse tsc msr pae mca cmov pat pse36
clflush dtst mpx cx8 apic sep mtrr pse36
clflush dtst acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpesng rdtscl
constant_tsc arch_perfmon pebs bts rep_good nopl xtopology
nonstop_tsc tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm
3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_ppn sbbd mba
ibrs ibpb stibp ibrs enhanced tpr_shadow vnum flexpriority ept vpid ept_ad
fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a avx512f
avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd
sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsavec cqm cqm
vmx_mbb_total vmx_mbb_local split_lock_detect wbinvd
dtherm ida arat pte avx512vmbi umip pku ospke avx512_vmbi2 gfnv vaes
vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq ia57 rdpid fsrm
md_clear pconf l f l1d arch_capabilities

Virtualization: VT-x
L1d cache: 3 MiB (64 instances)
L1i cache: 2 MiB (64 instances)
L2 cache: 80 MiB (64 instances)
L3 cache: 96 MiB (2 instances)
NUMA node(s): 2
NUMA node0 CPU(s): 0-31,64-95
NUMA node1 CPU(s): 32-63,96-127
Vulnerability Intel multithread: Not affected
Vulnerability L1ITE: Not affected
Vulnerability MDS: Not affected
Vulnerability Meltdown: Not affected
Vulnerability MMIO stale data: Mitigation; Clear CPU buffers; SMT vulnerable
Vulnerability Retbleed: Not affected
Vulnerability Spectre store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSB-IEBRAS SW

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SPEC CPU®2017 Integer Speed Result
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LENNOVO GLOBAL TECHNOLOGY

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SPEC CPU®2017 INT_PEAK = 12.4

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Test Date: Mar-2023
Hardware Availability: Jul-2021
Software Availability: Dec-2022

Platform Notes (Continued)

sequence
Vulnerability Svrbds: Not affected
Vulnerability Tsz async abort: Not affected

From lscpu --cache:

NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 3M 12 Data 1 64 1 64
L1i 32K 2M 8 Instruction 1 64 1 64
L2 1.3M 80M 20 Unified 2 1024 1 64
L3 48M 96M 12 Unified 3 65536 1 64

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0-31,64-95
node 0 size: 515632 MB
node 0 free: 514711 MB
node 1 cpus: 32-63,96-127
node 1 size: 516068 MB
node 1 free: 514565 MB
node distances:
node   0   1
0:  10  20
1:  20  10

9. /proc/meminfo
MemTotal: 1056462104 kB

10. who -r
run-level 3 Mar 9 14:46

11. Systemd service manager version: systemd 250 (250-12.el9_1)
  Default Target Status
  multi-user degraded

12. Failed units, from systemctl list-units --state=failed
  UNIT LOAD ACTIVE SUB DESCRIPTION
  * NetworkManager-wait-online.service loaded failed failed Network Manager Wait Online

13. Services, from systemctl list-unit-files
  STATE UNIT FILES
  enabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
dbus-broker getty@ irqbalance kdump low-memory-monitor mdmonitor microcode nis-domainname
rhncertd raslog rktld-daemon selinux-autorelabel-mark sshd systemd
systemd-network-generator udisks2 upower
dbus-broker getty@ irqbalance kdump low-memory-monitor mdmonitor microcode nis-domainname
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rhncertd raslog rktld-daemon selinux-autorelabel-mark sshd systemd
systemd-network-generator udisks2 upower
canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot
chrony-wait console-getty cpupower debug-shell firewalld kvm_stat
man-db-restart-cache-update nftables pesign rdisc rasm rasm-facts rpmdb-rebuild
serial-getty@ ssdh-keygen@ systemd-boot-check-no-failures systemd-pstore systemd-sysext
sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo

14. Linux kernel boot-time arguments, from /proc/cmdline

(Continued on next page)
Platform Notes (Continued)

15. cpupower frequency-info
   analyzing CPU 0:
   current policy: frequency should be within 800 MHz and 3.40 GHz.
   The governor "performance" may decide which speed to use
   within this range.
   boost state support:
   Supported: yes
   Active: yes

16. sysctl
   kernel.numa_balancing  1
   kernel.randomize_va_space  2
   vm.compaction_proactiveness  20
   vm.dirty_background_bytes  0
   vm.dirty_background_ratio  10
   vm.dirty_bytes  0
   vm.dirty_expire_centisecs  3000
   vm.dirty_ratio  20
   vm.dirty_writeback_centisecs  500
   vm.dirtytime_expire_seconds  43200
   vm.EXTfrag_threshold  500
   vm.min_unmapped_ratio  1
   vm.nr_hugepages  0
   vm.nr_hugepages_mempolicy  0
   vm.nr_overcommit_hugepages  0
   vm.swappiness  60
   vm.watermark_boost_factor  15000
   vm.watermark_scale_factor  10
   vm.zone_reclaim_mode  0

17. /sys/kernel/mm/transparent_hugepage
   defrag always defer defer+madvise [madvise] never
   enabled [always] madvise never
   hpage_pmd_size  2097152
   shmem_enabled always within_size advise [never] deny force

18. /sys/kernel/mm/transparent_hugepage/khugepaged
   alloc_sleep_millisecs  60000
   defrag  1
   max_ptes_none  511
   max_ptes_shared  256
   max_ptes_swap  64
   pages_to_scan  4096
   scan_sleep_millisecs  10000

19. OS release
   From /etc/*-release /etc/*-version
   os-release Red Hat Enterprise Linux 9.1 (Plow)
   redhat-release Red Hat Enterprise Linux release 9.1 (Plow)
   system-release Red Hat Enterprise Linux release 9.1 (Plow)

(Continued on next page)
Platform Notes (Continued)

20. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2023.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 820G 35G 786G 5% /home

21. /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR670 V2
Product Family: ThinkSystem
Serial: SITGGU81

22. dmidecode
Additional information from dmidecode 3.3 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:
32x Micron Technology 36ASF4G72PZ-3G2E7 32 GB 2 rank 3200

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: Lenovo
BIOS Version: 08E121H-1.50
BIOS Date: 02/09/2023
BIOS Revision: 1.50
Firmware Revision: 2.50

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)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

Fortran | 648.exchange2_s(base, peak)

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
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<td>Hardware Availability</td>
<td>Jul-2021</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Dec-2022</td>
</tr>
</tbody>
</table>

## Base Compiler Invocation

**C benchmarks:**

```
icx
```

**C++ benchmarks:**

```
icpx
```

**Fortran benchmarks:**

```
ifx
```

## Base Portability Flags

```
600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64  
602.gcc_s: -DSPEC_LP64  
605.mcf_s: -DSPEC_LP64  
620.omnetpp_s: -DSPEC_LP64  
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX  
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 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp  
-DSPEC_OPENMP  -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

**C++ benchmarks:**

```
-m64 -std=c++14 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

**Fortran benchmarks:**

```
-m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```
Lenovo Global Technology
ThinkSystem SR670 V2
(2.60 GHz, Intel Xeon Platinum 8358)

SPECspeed®2017_int_base = 12.2
SPECspeed®2017_int_peak = 12.4

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
600.perlbench_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)
   -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
   -flto -Ofast(pass 1) -xCORE-AVX512 -O3 -ffast-math
   -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
   -fiopenmp -DSPEC_OPENMP -fno-strict-overflow
   -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-AVX2(pass 1)
   -flto -Ofast(pass 1) -xCORE-AVX512 -O3 -ffast-math
   -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
   -fiopenmp -DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib
   -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3
   -ffast-math -flto -mfpmath=sse -funroll-loops
   -qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
   -fno-alias -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

657.xz_s: basepeak = yes

C++ benchmarks:

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR670 V2
(2.60 GHz, Intel Xeon Platinum 8358)

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-O.html
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-O.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.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 v1.1.9 on 2023-03-09 01:50:55-0500.
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