# Lenovo Global Technology

## ThinkSystem SR630 V3
**(2.10 GHz, Intel Xeon Platinum 8468)**

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<th>Test Sponsor</th>
<th>Lenovo Global Technology</th>
<th>Test Date:</th>
<th>Mar-2023</th>
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<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Feb-2023</td>
</tr>
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<td></td>
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<td>Software Availability:</td>
<td>Dec-2022</td>
</tr>
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</table>

### SPEC CPU2017 Integer Speed Result

- **CPU2017 License:** 9017
- **Test Sponsor:** Lenovo Global Technology
- **Tested by:** Lenovo Global Technology
- **CPU Name:** Intel Xeon Platinum 8468
- **Max MHz:** 3800
- **Nominal:** 2100
- **Enabled:** 96 cores, 2 chips, 2 threads/core
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **Cache L2:** 2 MB I+D on chip per core
- **Cache L3:** 105 MB I+D on chip per chip
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
- **Storage:** 1 x 960 GB SATA SSD

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP4 (x86_64)
- **Kernel:** 5.14.21-150400.22-default
- **Compiler:** C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.0 of Intel Fortran Compiler Classic for Linux; C/C++: Version 2023.0 of Intel C/C++ Compiler Classic for Linux
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version ESE109L 1.10 released Jan-2023
- **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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<thead>
<tr>
<th>Threads</th>
<th>600.perlbench_s</th>
<th>602.gcc_s</th>
<th>605.mcf_s</th>
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<tr>
<td></td>
<td>192</td>
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<td>Threads</td>
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</tbody>
</table>

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**Note:** All SPECbenchmarks are run with **14.8 threads**.
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Results Table

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</tr>
</tbody>
</table>

SPECspeed®2017_int_base = 14.8
SPECspeed®2017_int_peak = Not Run

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.xalancbmk_r / 623.xalancbmk_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

(Continued on next page)
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
SNC set to SNC2
C-state set to Legacy

Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Wed Mar  8 23:23:57 2023

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

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10. who -r
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12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
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17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS

1. uname -a
Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
x86_64 x86_64 x86_64 GNU/Linux

2. w

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**Platform Notes (Continued)**

23:23:57 up 1 min,  1 user, load average: 9.02, 4.61, 1.74
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
root     tty1     -                23:23   13.00s  0.80s  0.00s  -bash

3. Username
From environment variable $USER: root

4. ulimit -a
   core file size (blocks, -c) unlimited
   data seg size (kbytes, -d) unlimited
   scheduling priority (–e) 0
   file size (blocks, -f) unlimited
   pending signals (–l) 2062426
   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) 2062426
   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
runcpu --nobuild --action validate --define default-platform-flags --c
ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=96 --tune base -- all --define
intspeedaffinity --define smt-on --define drop_caches intspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=96 --tune base -- output_format all -- define
intspeedaffinity --define smt-on --define drop_caches --nopower --runmode speed --tune base -- size
refspeed intspeed --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.201/manuallogs/mainlogs/intspeed.intspeed.201.0.log --lognum 201.0 -- 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 8468
   vendor_id: GenuineIntel
   cpu family: 6
   model: 143
   stepping: 0
   microcode: 0x2b000161
   bugs: spectre_v1 spectre_v2 spec_store_bypass swaps
   cpu cores: 48
   siblings: 96
   2 physical ids (chips)
   192 processors (hardware threads)
   physical id 0: core ids 0-47
   physical id 1: core ids 0-47
   physical id 0: apicids 0-95

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SPEC CPU®2017 Integer Speed Result

Lenovo Global Technology
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Lenovo Global Technology

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SPECspeed®2017_int_base = 14.8
SPECspeed®2017_int_peak = Not Run

Platform Notes (Continued)

physical id 1: apicids 128-223
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 2.37.2:
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): 192
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Platinum 8468
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 48
Socket(s): 2
Stepping: 8
BogoMIPS: 4200.00
Flags:

Virtualization: VT-x
L1d cache: 4.5 MiB (96 instances)
L1i cache: 3 MiB (96 instances)
L2 cache: 192 MiB (96 instances)
L3 cache: 210 MiB (2 instances)

NUMA node(s): 4
NUMA node0 CPU(s): 0-23, 96-119
NUMA node1 CPU(s): 24-47, 120-143
NUMA node2 CPU(s): 48-71, 144-167
NUMA node3 CPU(s): 72-95, 168-191

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/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Sr qds: Not affected
Vulnerability Tsx async abort: Not affected

(Continued on next page)
Platform Notes (Continued)

From lscpu --cache:

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<thead>
<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d</td>
<td>48K</td>
<td>4.5M</td>
<td>12</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
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<tr>
<td>L1i</td>
<td>32K</td>
<td>3M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
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<tr>
<td>L2</td>
<td>2M</td>
<td>192M</td>
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<td>2</td>
<td>2048</td>
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<tr>
<td>L3</td>
<td>105M</td>
<td>210M</td>
<td>15</td>
<td>Unified</td>
<td>3</td>
<td>114688</td>
<td>1</td>
<td>64</td>
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</table>

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.

available: 4 nodes (0-3)
node 0 cpus: 0-23,96-119
node 0 size: 128675 MB
node 0 free: 127520 MB
node 1 cpus: 24-47,120-143
node 1 size: 129011 MB
node 1 free: 128629 MB
node 2 cpus: 48-71,144-167
node 2 size: 128977 MB
node 2 free: 128701 MB
node 3 cpus: 72-95,168-191
node 3 size: 128965 MB
node 3 free: 128634 MB
node distances:
node   0   1   2   3
0:  10  12  21  21
1:  12  10  21  21
2:  21  21  10  12
3:  21  21  12  10

9. /proc/meminfo
MemTotal: 528005564 kB

10. who -r
run-level 3 Mar 8 23:23

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files
STATE   UNIT FILES
enabled  YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance
issue-generator kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog
smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
systemd-remount-fs
enabled-runtime autosfs aut sysvinit weirdo haveged-kernel kernel-parameters kernel-start-up

disabled autocfs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
chronyd console-getty cups cups-browsed debug-shell ebt labs exchange-bmc-os info
firewalld gpm grub2-once haveged-switch-root ipmi ipmielvd issue-add-ssh-keys keksec-load
lvmvolumegroup man-db-create multipathd nfs nfs-bikemap rdisc rdist rpcbind rsyslog
rsyncd serial-getty@ smartrd_generate_opts snmp snmptrapd systemctl-boot-check-no-failures
smartrd smartrd-network-generator systemd-sysdist systemd-syslog systemd-timesyncd
indirect wicked

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

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SPECspeed\textsuperscript{®}2017\textsubscript{\textregistered} int\_base = 14.8
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Platform Notes (Continued)

BOOT\_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=efe3d3bb-d17b-48bc-af3c-7ee429916327
splash=silent
mitigations=auto
quiet
security=apparmor

14. cpupower frequency-info
analyzing CPU 0:
Unable to determine current policy
boost state support:
  Supported: yes
  Active: yes

15. 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.extrfrag.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

16. /sys/kernel/mm/transient_hugepage
  defrag always defer defer+madvice [madvice] never
  enabled [always] madvice never
  hpage_pmd_size 2097152
  shmem_enabled always within_size advise [never] deny force

17. /sys/kernel/mm/transient_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

18. OS release
From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 15 SP4

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Platform Notes (Continued)

19. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2023.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 894G 65G 830G 8% /

20. /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR630 V3 MB, EGS, DDR5, NY, 1U
Product Family: ThinkSystem
Serial: 1234567890

21. dmidecode
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:
2x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800
14x Samsung M321R4GA3BB0-CQKV 32 GB 2 rank 4800

22. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: Lenovo
BIOS Version: ESE109L-1.10
BIOS Date: 01/07/2023
BIOS Revision: 1.10
Firmware Revision: 1.0

Compiler Version Notes

C       | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base) 657.xz_s(base)
------------------------------------------------------------------------------------------------------------
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) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)
------------------------------------------------------------------------------------------------------------
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)
------------------------------------------------------------------------------------------------------------
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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### SPECspeed®2017_int_peak = Not Run

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Lenovo Global Technology</th>
<th>Test Date: Mar-2023</th>
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<tr>
<td>Hardware Availability</td>
<td>Lenovo Global Technology</td>
<td>Test Sponsor: Lenovo Global Technology</td>
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<td>Software Availability</td>
<td>Lenovo Global Technology</td>
<td>Tested by: Lenovo Global Technology</td>
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### Base Compiler Invocation

C benchmarks:
- icx

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifx

### Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tr>
<td>perlbench_s</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
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<tr>
<td>gcc_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>mcf_s</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>vallancbmk_s</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
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<td>x264_s</td>
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<td>deepsjeng_s</td>
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<td>leela_s</td>
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<td>exchange2_s</td>
<td>-DSPEC_LP64</td>
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<td>xz_s</td>
<td>-DSPEC_LP64</td>
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</table>

### Base Optimization Flags

#### C benchmarks:
- m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -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 -xsapphirerapids -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 -xsapphirerapids -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
# SPEC CPU®2017 Integer Speed Result

Lenovo Global Technology
ThinkSystem SR630 V3
(2.10 GHz, Intel Xeon Platinum 8468)

<table>
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<tr>
<th>SPECspeed®2017_int_base = 14.8</th>
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<td>SPECspeed®2017_int_peak = Not Run</td>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Mar-2023  
**Hardware Availability:** Feb-2023  
**Software Availability:** Dec-2022

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 2023-03-08 10:23:56-0500.
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