### Lenovo Global Technology

ThinkSystem SR630 V3
(2.00 GHz, Intel Xeon Platinum 8450H)

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

<table>
<thead>
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<th>Threads</th>
<th>SPECspeed®2017_int_base = 13.5</th>
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<tbody>
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<td>602.gcc_s 112</td>
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<td>620.omnetpp_s 112</td>
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<td>623.xalancbmk_s 112</td>
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<td>631.deepsjeng_s 112</td>
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<tr>
<td>641.leela_s 112</td>
<td>5.24</td>
</tr>
<tr>
<td>648.exchange2_s 112</td>
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<tr>
<td>657.xz_s 112</td>
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</tr>
</tbody>
</table>

**SPECspeed®2017_int_peak = Not Run**

---

### Hardware

- **CPU Name:** Intel Xeon Platinum 8450H  
- **Max MHz:** 3500  
- **Nominal:** 2000  
- **Enabled:** 56 cores, 2 chips, 2 threads/core  
- **Orderable:** 1.2 chips  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **L2:** 2 MB I+D on chip per core  
- **L3:** 75 MB I+D on chip per core  
- **Other:** None  
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

### 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
**SPEC CPU®2017 Integer Speed Result**

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**Results Table**

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<th>Seconds</th>
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</table>

**SPECspeed®2017_int_base** = 13.5

**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)
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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
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 test1 Fri Feb 17 17:54:30 2023

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

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4. ulimit -a
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7. lscpu
8. numactl --hardware
9. /proc/meminfo
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. sysct1
16. /sys/kernel/mm/transparent_hugepage
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 test1 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

(Continued on next page)
Platform Notes (Continued)

17:54:30 up 3 min, 1 user, load average: 0.53, 1.37, 0.69
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 17:52 6.00s 0.88s 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) 2062576
   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
   cpu time (seconds, -t) unlimited
   max user processes (-u) 2062576
   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-sapphirerapids-speed-20221201.cfg --define cores=56 --tune base -o 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=56 --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/CP2017.097/templogs/preenv.intspeed.097.0.log --lognum 097.0 --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 8450H
   vendor_id : GenuineIntel
   cpu family : 6
   model : 143
   stepping : 0
   microcode : 0x2b000161
   bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores : 28
   siblings : 56
   2 physical ids (chips)
   112 processors (hardware threads)
   physical id 0: core ids 0-27
   physical id 1: core ids 0-27
   physical id 0: apicids 0-55

(Continued on next page)
Platform Notes (Continued)

physical id 1: apicids 128-183
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):                          112
On-line CPU(s) list:             0-111
Vendor ID:                       GenuineIntel
Model name:                      Intel(R) Xeon(R) Platinum 8450H
CPU family:                      6
Model:                           143
Thread(s) per core:              2
Core(s) per socket:              28
Socket(s):                       2
Stepping:                        8
BogoMIPS:                        4000.00
Flags:                           fpu vme de pse tsc msr pae mce cmov pat pse36
                               clflush dts acpi mpx cmx8 apic sep mce cx8
                               mpx cmx8 apic perfmon pebs bts rep_good nopl xtopology
                               nonstop tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64
                               monitor ds cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid
                               dca sse4_1 l2e
                               x2apic movbe popcnt tsc_deadline_timer aes xSAVE f16c rdrand
                               lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cat_l2 cd pcdp
                               invpcid_single intel_pqlm cpq mcpu mbm iibp stibp ibrs ibrs enhanced
                               tpr_shadow vmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bm11
                               hle
                               avx2 smep bmi2 etsr invcid rtm cqm rdt_a avx512f avx512dq rdseed adx
                               smap
                               avx512sfma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl
                               xsaveopt xavvec xetb pxsave xsaves cqm_l1c cqm_occmap_l1c cqm_mm_total
                               cqm_mm_local split_lock_detect avx_vnni avx512_bf16 wbnoinvd dther ida
                               arat pln pts avx512vbmi umip pku ospke waitp8k avx512_vbmi gfini vaes
                               vpcm10ldq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid
                               bus_lock_detect cldmote movdiri movdir64b enqcmsg form md_clear serialize
                               txdtrk pconfg arch_addr avx512_fp16 amx_tile flush_lld arch_capabilities
                               Virtualization:  VT-x
                               L1d cache:        2.6 MiB (56 instances)
                               L1i cache:        1.8 MiB (56 instances)
                               L2 cache:        112 MiB (56 instances)
                               L3 cache:        150 MiB (2 instances)
                               NUMA node(s): 4
                               NUMA node0 CPU(s): 0-13,56-69
                               NUMA node1 CPU(s): 14-27,70-83
                               NUMA node2 CPU(s): 28-41,84-97
                               NUMA node3 CPU(s): 42-55,98-111
                               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/swapsgs barriers and __user pointer sanitization
                               Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
                               Vulnerability Srbd: Not affected
                               Vulnerability Txs async abort: Not affected

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**Platform Notes (Continued)**

From lscpu --cache:

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<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
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<td>12</td>
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<td>2048</td>
<td>1</td>
<td>64</td>
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<tr>
<td>L3</td>
<td>75M</td>
<td>150M</td>
<td>15</td>
<td>Unified</td>
<td>3</td>
<td>81920</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</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: 0-13,56-69
node 0 size: 128680 MB
node 0 free: 127817 MB
node 1 cpus: 14-27,70-83
node 1 size: 128982 MB
node 1 free: 128444 MB
node 2 cpus: 28-41,84-97
node 2 size: 129016 MB
node 2 free: 128724 MB
node 3 cpus: 42-55,98-111
node 3 size: 128988 MB
node 3 free: 128694 MB
node distances:

<table>
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<tr>
<th>node</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
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<td>21</td>
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<tr>
<td>1</td>
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<td>2</td>
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<tr>
<td>3</td>
<td>21</td>
<td>21</td>
<td>12</td>
<td>10</td>
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</tbody>
</table>

---

9. /proc/meminfo

MemTotal: 528044048 kB

---

10. who -r

run-level 3 Feb 17 17:51

---

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)

<table>
<thead>
<tr>
<th>Default Target</th>
<th>Status</th>
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<tbody>
<tr>
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</table>

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12. Services, from systemctl list-unit-files

<table>
<thead>
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<th>STATE</th>
<th>UNIT FILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>enabled</td>
<td>YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance iscsi issue-generator kbdsettings klog lvm2-monitor nsd postfix purge-kernels rollback rsyslog smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny systemd-remount-fs</td>
</tr>
<tr>
<td>generated</td>
<td>ntp_sync</td>
</tr>
<tr>
<td>indirect</td>
<td>wicked</td>
</tr>
</tbody>
</table>

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Platform Notes (Continued)

13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=f976c541-a329-4c54-ba84-4be16556ee18
   splash=silent
   mitigations=auto
   quiet
   security=apparmor

14. cpupower frequency-info
   analyzing CPU 0:
   Unable to determine current policy
   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.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

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

17. /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

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

ThinkSystem SR630 V3
(2.00 GHz, Intel Xeon Platinum 8450H)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>13.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

Test Date: Feb-2023
Hardware Availability: Feb-2023
Software Availability: Dec-2022

Platform Notes (Continued)

19. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2023.0
/dev/sda2 xfs 894G 92G 803G 11% /

20. /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR630 V3
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:
1x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800
5x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800
10x Samsung M321R4GA3BB0-CQKV0 32 GB 2 rank 4800

22. BIOS
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.kalancbmk_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. |
Lenovo Global Technology
ThinkSystem SR630 V3 (2.00 GHz, Intel Xeon Platinum 8450H)

SPECsmode®2017_int_base = 13.5
SPECsmode®2017_int_peak = Not Run

CPU2017 License: 9017
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Test Date: Feb-2023
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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 -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fopenmp
-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
# Lenovo Global Technology

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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 2023-02-17 04:54:29-0500.  
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