## Lenovo Global Technology

ThinkSystem SR650 V3  
(2.20 GHz, Intel Xeon Gold 6438M)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>15.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
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<table>
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<tr>
<th>Threads</th>
<th>SPECspeed®2017_int_base (15.2)</th>
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</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6438M
- **Max MHz:** 3900
- **Nominal:** 2200
- **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:** 2 MB I+D on chip per core
- **L3:** 60 MB I+D on chip per chip
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
- **Storage:** 1 x 480 GB SATA SSD
- **Other:** None
- **Other:** None
- **Software:** 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
Lenovo Global Technology
ThinkSystem SR650 V3
(2.20 GHz, Intel Xeon Gold 6438M)

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

Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
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<th>Seconds</th>
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<th>Ratio</th>
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</table>

SPECspeed®2017_int_base = 15.2
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 623.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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SPECSPEED®2017_int_base = 15.2
SPECSPEED®2017_int_peak = Not Run

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

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.

Platform Notes

BIOS configuration:
Operating Mode set to Custom Mode
CPU P-State Control set to Legacy

Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c88b7ed5c6ae2c92cc97bec197
running on localhost Wed Feb 22 21:48:56 2023

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

Table of contents

1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numacl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
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 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
    21:48:56 up 5 min, 1 user, load average: 0.00, 0.02, 0.00

(Continued on next page)
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Test Sponsor: Lenovo Global Technology
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Platform Notes (Continued)

<table>
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<tr>
<th>USER</th>
<th>TTY</th>
<th>FROM</th>
<th>LOGIN@</th>
<th>IDLE</th>
<th>JCPU</th>
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<th>WHAT</th>
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</thead>
<tbody>
<tr>
<td>root</td>
<td>tty1</td>
<td>-</td>
<td>21:48</td>
<td>8.00s</td>
<td>1.57s</td>
<td>0.01s</td>
<td>-bash</td>
</tr>
</tbody>
</table>

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 (-i) 2062490
   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) 2062490
   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
   -bash
   runcpu --nobuild --action validate --define default-platform-flags -c
   ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=64 --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=64 --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/CPU2017.133/templogs/preenv.intspeed.133.0.log --lognum 133.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017-1.1.9-ic2023.0

6. /proc/cpuinfo
   model name : Intel(R) Xeon(R) Gold 6438M
   vendor_id : GenuineIntel
   cpu family : 6
   model : 143
   stepping : 8
   microcode : 0xb2000161
   bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
   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
   physical id 0: apicids 0-63

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

**Lenovo Global Technology**

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

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**Platform Notes (Continued)**

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.

---

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):                          128
On-line CPU(s) list:             0-127
Vendor ID:                       GenuineIntel
Model name:                      Intel(R) Xeon(R) Gold 6438M
CPU family:                      6
Model:                           143
Thread(s) per core:              2
Core(s) per socket:              32
Socket(s):                       2
Stepping:                        8
Frequency boost:                 enabled
CPU max MHz:                     2201.0000
CPU min MHz:                     800.0000
BogoMIPS:                        4400.00
Flags:                           fpu vme de pse mce cmov pat pse36
clflush dtc acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xapic cleansyscall
clflushopt parse_data xtrunc mmcx eax167 vxpm vmmid vmsel nonsse3
```

---

**Virtualization:** VT-x  
**L3 cache:** 120 MiB (2 instances)  
**NUMA node(s):** 2  
**NUMA node0 CPU(s):** 0-31, 64-95  
**NUMA node1 CPU(s):** 32-63, 96-127

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

From `lscpu --cache`:

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<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>
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<td>48K</td>
<td>3M</td>
<td>12</td>
<td>Data</td>
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<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>2M</td>
<td>8</td>
<td>Instruction</td>
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<td>L2</td>
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<td>128M</td>
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<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>60M</td>
<td>120M</td>
<td>15</td>
<td>Unified</td>
<td>3</td>
<td>65536</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: 2 nodes (0-1)
- node 0 cpus: 0-31,64-95
- node 0 size: 257695 MB
- node 0 free: 256855 MB
- node 1 cpus: 32-63,96-127
- node 1 size: 257950 MB
- node 1 free: 257185 MB
- node distances:
  - node 0: 10 21
  - node 1: 21 10

9. `/proc/meminfo`

- MemTotal: 528022100 kB

10. `who -r`

- run-level 3 Feb 22 21:43

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

- Default Target: `multi-user`
- Status: `running`

12. `services, from systemctl list-unit-files`

<table>
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<tr>
<th>STATE</th>
<th>UNIT</th>
<th>FILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>enabled</td>
<td>YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance iscsi issue-generator kbssettings lkm vmb-monitor nscd postfix purge-kernels rollback rayslog smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny</td>
<td></td>
</tr>
<tr>
<td>enabled-runtime</td>
<td>systemd-remount-fs</td>
<td></td>
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<tr>
<td>indirect</td>
<td>wicked</td>
<td></td>
</tr>
</tbody>
</table>

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

- `BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default`
- `root=UUID=cf0c8526-2665-4565-b656-0513c168d1bb`
- `splash=always`
- `mitigations=auto`
- `quiet`
- `security=apparmor`

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

14. cpupower frequency-info
   analyzing CPU 0:
   current policy: frequency should be within 800 MHz and 2.20 GHz.
   The governor "ondemand" may decide which speed to use
   within this range.

   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.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
   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

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_swap          4096
   scan_sleep_millisecs   10000

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

19. Disk information
   SPEC is set to: /home/cpu2017-1.1.9-ic2023.0
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda3      xfs   446G   54G  393G  12% /

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

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<td>9017</td>
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### Platform Notes (Continued)

20. /sys/devices/virtual/dmi/id
   Vendor: Lenovo
   Product: ThinkSystem SR650 V3 MB, EGS, DDR5, SH, 2U
   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:
   9x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800
   7x Samsung M321R4GA3BB0-CQKVG 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

<table>
<thead>
<tr>
<th>Base Compiler Invocation</th>
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<td>Test Sponsor: Lenovo Global Technology</td>
<td>Hardware Availability: Feb-2023</td>
</tr>
<tr>
<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: Dec-2022</td>
</tr>
</tbody>
</table>

**Base Compiler Invocation (Continued)**

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 -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
## Lenovo Global Technology

**ThinkSystem SR650 V3**  
(2.20 GHz, Intel Xeon Gold 6438M)

<table>
<thead>
<tr>
<th>SPECs$$pe$$d$^{\text{2017 int base}}$</th>
<th>15.2</th>
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<td>SPEC$\text{s}$$pe$$d$^{\text{2017 int peak}}</td>
<td>Not Run</td>
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- **CPU2017 License**: 9017  
- **Test Sponsor**: Lenovo Global Technology  
- **Tested by**: Lenovo Global Technology

The flags files that were used to format this result can be browsed at
- [http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.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/Intel-ic2023-official-linux64.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.

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