## Lenovo Global Technology

**ThinkSystem SR650 V3**  
(2.10 GHz, Intel Xeon Gold 6418H)

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<th>9017</th>
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<th>Mar-2023</th>
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<td><strong>Hardware Availability:</strong></td>
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<td><strong>Software Availability:</strong></td>
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| SPECspeed®2017_int_base = 15.3 | SPECspeed®2017_int_peak = Not Run |

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</table>

### HARDWARE

**CPU Name:** Intel Xeon Gold 6418H  
**Max MHz:** 4000  
**Nominal:** 2100  
**Enabled:** 48 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  
**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)  
**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
(2.10 GHz, Intel Xeon Gold 6418H)

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

Results Table

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<thead>
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</table>

SPECSpeed\textsuperscript{2017\_int\_base} = 15.3
SPECSpeed\textsuperscript{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\_STACK\_SIZE = "192M"

General Notes

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

(Continued on next page)
## Lenovo Global Technology

**ThinkSystem SR650 V3**  
(2.10 GHz, Intel Xeon Gold 6418H)

### SPEC CPU®2017 Integer Speed Result

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>SPECspeed®2017_int_base</td>
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</tr>
<tr>
<td>SPECspeed®2017_int_peak</td>
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</tbody>
</table>

### 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  
SNC set to SNC2

Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92c097bec197  
running on localhost Thu Mar 2 17:20:25 2023

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

---

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18. /sys/kernel/mm/transparent_hugepage/khugepaged  
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21. /sys/devices/virtual/dmi/id  
22. dmidecode  
23. 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

---

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

#### 2. `w`

```
17:20:25 up 1 min,  1 user,  load average: 0.12, 0.04, 0.01
USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
root     tty1     -                17:19    9.00s  1.02s  0.01s -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                 (-i) 2062589
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) 2062589
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
```

#### 6. `/proc/cpuinfo`

```
model name      : Intel(R) Xeon(R) Gold 6418H
vendor_id       : GenuineIntel
cpu family      : 6
model           : 143
stepping        : 8
microcode       : 0x2b000161
bugs            : spectre_v1 spectre_v2 spec_store_bypass swaps
```

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

physical id 1: core ids 0-23
physical id 0: apic ids 0-47
Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

8. 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): 96
On-line CPU(s) list: 0-95
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Gold 6418H
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 2
Stepping: 8
Frequency boost: enabled
CPU max MHz: 2101.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00

Flags: 

fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dtsc 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 aperf perfmac tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cat_l2 cdp cdp_l3

Frequency boost: enabled
CPU max MHz: 2101.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00

Flags:

Virtualization: VT-x
L1d cache: 2.3 MiB (48 instances)
L1i cache: 1.5 MiB (48 instances)
L2 cache: 96 MiB (48 instances)
L3 cache: 120 MiB (2 instances)
NUMA node(s): 4
NUMA node0 CPU(s): 0-11,48-59
NUMA node1 CPU(s): 12-23,60-71
NUMA node2 CPU(s): 24-35,72-83
NUMA node3 CPU(s): 36-47,84-95

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

(Continued on next page)
Lenovo Global Technology
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SPECSpeed®2017_int_base = 15.3
SPECSpeed®2017_int_peak = Not Run

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

Platform Notes (Continued)

Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:

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<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
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<th>COHERENCY-SIZE</th>
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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: 0-11, 48-59
node 0 size: 128680 MB
node 0 free: 127864 MB
node 1 cpus: 12-23, 60-71
node 1 size: 129017 MB
node 1 free: 128291 MB
node 2 cpus: 24-35, 72-83
node 2 size: 128983 MB
node 2 free: 128480 MB
node 3 cpus: 36-47, 84-95
node 3 size: 128989 MB
node 3 free: 128557 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: 528047368 kB

10. who -r
run-level 3 Mar 2 17:19

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 USER FILES
enabled YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance
issue-generator kbdsettings lvm2-monitor nscd postfix purge-kernels rollback rsyslog
smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
systemd-remount-fs
enabled-runtime autofs auttoyast-ntscripts blk-availability boot-sysctl ca-certificates chrony-wait
chronyd console-getty cups cups-browsed debug-shell ebtables exchange-lmc-os-info
firewalld gpm grub2-once haveged-switch-root ipmi ipmi8evd issue-add-ssh-keys kexec-load
lunmask man-db-create multipathd nfs nfs-bkmap rdisc rpcbind rsysconfcheck rsysncd
sapconf serial-getty@ smartd_generate_opts snmpd snmptrapd sysstat

(Continued on next page)
Platform Notes (Continued)

13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=461ffbd6-8da0-4c20-adb7-d9d3143b6aa5
   splash=silent
   mitigations=auto
   quiet
   security=apparmor

------------------------------------------------------------------------------------------------

14. cpupower frequency-info
   analyzing CPU 0:
   current policy: frequency should be within 800 MHz and 2.10 GHz.
   The governor *performance* may decide which speed to use
   within this range.
   boost state support:
   Supported: yes
   Active: yes

------------------------------------------------------------------------------------------------

15. tuned-adm active
   It seems that tuned daemon is not running, preset profile is not activated.
   Preset profile: virtual-guest

------------------------------------------------------------------------------------------------

16. sysctl
   kernel.numa_balancing            1
   kernel.randomize_va_space        2
   vm.compartment_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+madvice [madvice] never
   enabled [always] madvice never
   hpage_pmd_size 2097152
   shm_enabled always within_size advise [never] deny force

------------------------------------------------------------------------------------------------

18. /sys/kernel/mm/transparent_hugepage/khugepaged
   alloc_sleep_millisecs 60000

(Continued on next page)
### Lenovo Global Technology

ThinkSystem SR650 V3  
(2.10 GHz, Intel Xeon Gold 6418H)

**SPECspeed®2017_int_base = 15.3**
**SPECspeed®2017_int_peak = Not Run**

---

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

---

**Platform Notes (Continued)**

```plaintext
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 SUSE Linux Enterprise Server 15 SP4

---

**20. Disk information**  
SPEC is set to: `/home/cpu2017-1.1.9-ic2023.0`  
Filesystem     Type  Size  Used Avail Use% Mounted on  
/dev/sda3      xfs   889G  102G  788G  12% /

---

**21. `/sys/devices/virtual/dmi/id`**  
Vendor:         Lenovo  
Product:        ThinkSystem SR650 V3 MB,EGS,DDR5,SH,2U  
Product Family: ThinkSystem  
Serial:         1234567890

---

**22. 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:  
16x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800

---

**23. 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**

```plaintext
C       | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base) 657.xz_s(base)
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.

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

**Lenovo Global Technology**
ThinkSystem SR650 V3
(2.10 GHz, Intel Xeon Gold 6418H)

<table>
<thead>
<tr>
<th>SPEC CPU®2017_int_base</th>
<th>15.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPEC CPU®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**Compiler Version Notes (Continued)**

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.

**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 -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

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

Lenovo Global Technology
ThinkSystem SR650 V3
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SPECspeed®2017_int_base = 15.3
SPECspeed®2017_int_peak = Not Run

Base Optimization Flags (Continued)

Fortran benchmarks:
-m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -gopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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 2023-03-02 04:20:25-0500.
Originally published on 2023-03-28.