# Lenovo Global Technology

## ThinkSystem SD530 V3 (2.10 GHz, Intel Xeon Gold 6538N)

**SPECrater®2017_int_base = 567**

**SPECrater®2017_int_peak = Not Run**

<table>
<thead>
<tr>
<th>Copy</th>
<th>Benchmark</th>
<th>Result</th>
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<tbody>
<tr>
<td>0</td>
<td>500.perlbench_r</td>
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<td></td>
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<td>128</td>
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<tr>
<td></td>
<td>557.xz_r</td>
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</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6538N
- **Max MHz:** 4100
- **Nominal:** 2100
- **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:** 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R, running at 5200)
- **Storage:** 1 x 960 GB M.2 NVME SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP5
- **Kernel:** 5.14.21-150500.53-default
- **Compiler:** C/C++: Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;
- **Parallel:** No
- **Firmware:** Lenovo BIOS Version FNE113F 2.20 released Jan-2024
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Ratio</th>
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**SPECrated®2017_int_base = 567**

**SPECrated®2017_int_peak = Not Run**

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

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## 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:

```
LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-ic2023.2.3/lib/intel64:/home/cpu2017-1.1.9-ic2023.2.3/lib/ia32:/home/cpu2017-1.1.9-ic2023.2.3/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

## General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM

memory using Red Hat Enterprise Linux 8.4

Transparent Huge Pages enabled by default

Prior to runcpu invocation

Filesystem page cache synced and cleared with:

```
sync; echo 3 > /proc/sys/vm/drop_caches
```

runcpu command invoked through numactl i.e.:

```
numactl --interleave=all runcpu <etc>
```

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.

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

Lenovo Global Technology
ThinkSystem SD530 V3
(2.10 GHz, Intel Xeon Gold 6538N)

SPECrate®2017_int_base = 567
SPECrate®2017_int_peak = Not Run

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

General Notes (Continued)
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:
Choose Operating Mode set to Maximum Performance
SNC set to SNC2
LLC Prefetch set to Disabled

Sysinfo program /home/cpu2017-1.1.9-ic2023.2.3/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc97bec197
running on localhost Sun Feb 18 21:05:59 2024

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: systemctl
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. syustl
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 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)
x86_64 x86_64 x86_64 GNU/Linux

2. w
21:05:59 up 3:09, 1 user, load average: 81.08, 115.96, 122.98
USER TTY FROM LOGING IDLE JCPU PCPU WHAT
root tty1 - 17:57 3:07m 1.08s 0.01s /bin/bash ./rate_int.sh

3. Username
From environment variable $USER: root

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

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) 4126879
   - 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) 4126879
   - virtual memory: (kbytes, -v) unlimited
   - file locks: (-x) unlimited

5. sysinfo process ancestry
   - /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   - login -- root
   - /bin/bash ./rate_int.sh
   - /bin/bash ./rate_int.sh
   - runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 -c ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=64 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune base -o all intrate
   - runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=64 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode rate --tune base --size refrate intrate --nopreenv --note-preenv --logfile $SPEC/tmp/CPU2017.598/templogs/preenv.intrate.598.0.log --lognum 598.0 --from_runcpu 2
   - specperl $SPEC/bin/sysinfo
   - $SPEC = /home/cpu2017-1.1.9-ic2023.2.3

6. /proc/cpuinfo
   - model name: INTEL(R) XEON(R) GOLD 6538N
   - vendor_id: GenuineIntel
   - cpu family: 6
   - model: 207
   - stepping: 2
   - microcode: 0x21000200
   - bugs: spectre_v1 spectre_v2 spec_store_bypass swapgs 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
   - physical id 0: apicids 0-63
   - physical id 1: apicids 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:

(Continued on next page)
Platform Notes (Continued)

Virtualization: VT-x
L1d cache: 3MiB (64 instances)
L1i cache: 2MiB (64 instances)
L2 cache: 128MiB (64 instances)
L3 cache: 120MiB (2 instances)
NUMA node(s): 4
NUMA node0 CPU(s): 0-15, 64-79
NUMA node1 CPU(s): 16-31, 80-95
NUMA node2 CPU(s): 32-47, 96-111
NUMA node3 CPU(s): 48-63, 112-127
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSB-eIBRS SW sequence
Vulnerability Srbd$s: Not affected
Vulnerability Txs async abort: Not affected

From lscpu --cache:

<table>
<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>
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<td>L1d</td>
<td>48K</td>
<td>3M</td>
<td>12</td>
<td>Data</td>
<td>1</td>
<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>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L2</td>
<td>2M</td>
<td>128M</td>
<td>16</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

(Continued on next page)
Platform Notes (Continued)

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0-15,64-79
node 0 size: 257703 MB
node 0 free: 256352 MB
node 1 cpus: 16-31,80-95
node 1 size: 258039 MB
node 1 free: 256802 MB
node 2 cpus: 32-47,96-111
node 2 size: 258039 MB
node 2 free: 256745 MB
node 3 cpus: 48-63,112-127
node 3 size: 257966 MB
node 3 free: 256762 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: 1056511816 kB

10. who -r
run-level 3 Feb 18 17:57

11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
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@ irqbalance issue-generator
                    kbdsettings lvm2-monitor nscd nvme-boot-connections postfix purge-kernels rollback
                    rsyslog smartd sshd systemd-pstare wicked wickeddd-auto4 wickeddd-dhcp4 wickeddd-dhcp6
                    wickeddd-nanny
enabled-runtime     systemd-remount-fs
disabled            autosfs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                    chronyd console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info
                    firewalld gpm grub2-once haveged haveged-switch-root ipmi ipmievd issue-add-ssh-keys
                    kexec-load lumnask man-db-create multipathd nfs nfs-blkmap nvmf-autoconnect rpcbind
                    rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts snmpd snmptrapd
                    systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                    systemd-time-wait-sync systemd-timesyncd
indirect
wickeddd

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
root=UUID=f243a704-c613-4a2e-b642-e5754787f2a2
splash=silent

(Continued on next page)
Lenovo Global Technology

ThinkSystem SD530 V3
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SPECrate®2017_int_base = 567
SPECrate®2017_int_peak = Not Run

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

Test Date: Feb-2024
Hardware Availability: Mar-2024
Software Availability: Dec-2023

Platform Notes (Continued)

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               0
   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] madvice never
    hpage_pmd_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 SP5

19. Disk information
    SPEC is set to: /home/cpu2017-1.1.9-ic2023.2.3
    Filesystem     Type Size Used Avail Use% Mounted on

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

Lenovo Global Technology
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SPECrate®2017_int_base = 567
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Feb-2024
Hardware Availability: Mar-2024
Software Availability: Dec-2023

Platform Notes (Continued)
/dev/nvme0n1p3 xfs  893G  29G  864G  4% /
-------------------------------------------------------------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SD530 V3
Product Family: ThinkSystem
Serial: PASDVMK006

-------------------------------------------------------------------------------------------------------------------
21. dmidecode
Additional information from dmidecode 3.4 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:
6x Samsung M321R8GA0PB0-CWMKH 64 GB 2 rank 5600, configured at 5200
10x Samsung M321R8GA0PB0-CWMXH 64 GB 2 rank 5600, configured at 5200

-------------------------------------------------------------------------------------------------------------------
22. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: Lenovo
BIOS Version: PNE113P-2.20
BIOS Date: 01/02/2024
BIOS Revision: 2.20
Firmware Revision: 1.10

Compiler Version Notes
-------------------------------------------------------------------------------------------------------------------
| C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base) |
-------------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++\C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
-------------------------------------------------------------------------------------------------------------------
| C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base) |
-------------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++\C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
-------------------------------------------------------------------------------------------------------------------
| Fortran | 548.exchange2_r(base) |
-------------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
-------------------------------------------------------------------------------------------------------------------

Base Compiler Invocation
C benchmarks:
icx

(Continued on next page)
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(2.10 GHz, Intel Xeon Gold 6538N)

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### Base Compiler Invocation (Continued)

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifx

### Base Portability Flags

```plaintext
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

### Base Optimization Flags

#### C benchmarks:
- `-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin -lqkmalloc`

#### C++ benchmarks:
- `-w -std=++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin -lqkmalloc`

#### Fortran benchmarks:
Lenovo Global Technology
ThinkSystem SD530 V3
(2.10 GHz, Intel Xeon Gold 6538N)

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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-AA.html
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-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-AA.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-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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