



# SPEC CPU®2017 Integer Speed Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SD550 V3  
(2.20 GHz, Intel Xeon Gold 5520+)

SPECspeed®2017\_int\_base = 14.4

SPECspeed®2017\_int\_peak = Not Run

CPU2017 License: 9017

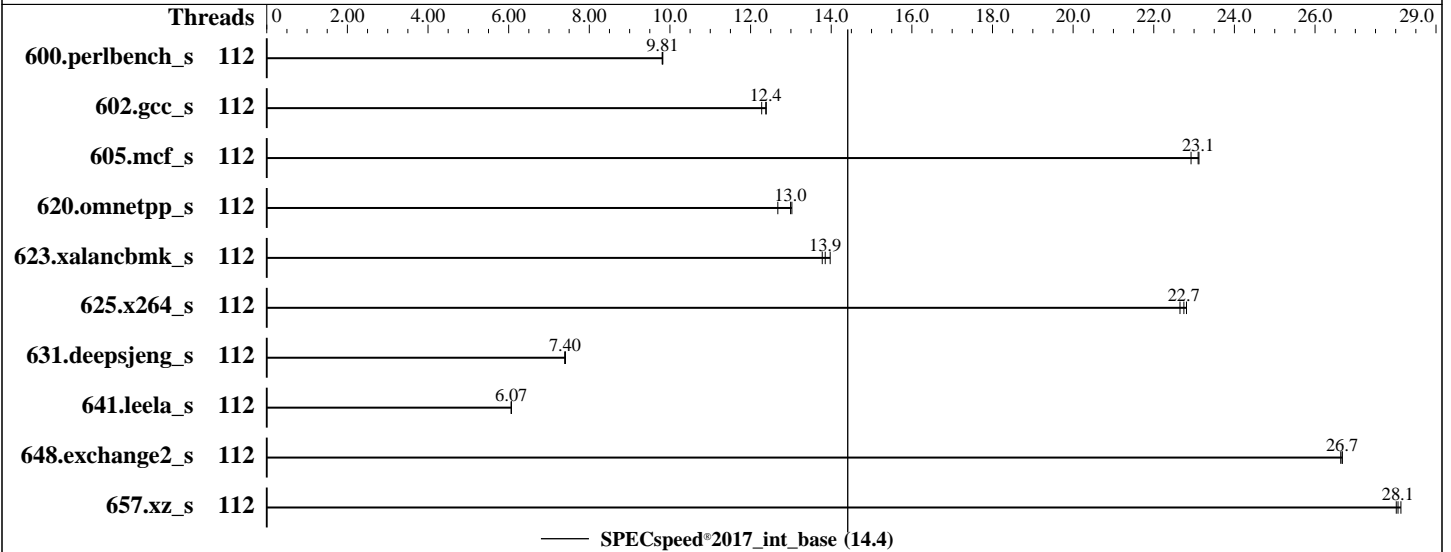
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2024

Hardware Availability: Mar-2024

Software Availability: Dec-2023



### Hardware

CPU Name: Intel Xeon Gold 5520+  
 Max MHz: 4000  
 Nominal: 2200  
 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: 52.5 MB I+D on chip per chip  
 Other: None  
 Memory: 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R, running at 4800)  
 Storage: 1 x 480 GB SATA 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: Yes  
 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: 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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## Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	112	<b>181</b>	<b>9.81</b>	181	9.82	181	9.81							
602.gcc_s	112	324	12.3	321	12.4	<b>322</b>	<b>12.4</b>							
605.mcf_s	112	206	22.9	<b>204</b>	<b>23.1</b>	204	23.1							
620.omnetpp_s	112	129	12.7	<b>126</b>	<b>13.0</b>	125	13.0							
623.xalancbmk_s	112	101	14.0	103	13.8	<b>102</b>	<b>13.9</b>							
625.x264_s	112	<b>77.5</b>	<b>22.7</b>	77.9	22.7	77.3	22.8							
631.deepsjeng_s	112	<b>194</b>	<b>7.40</b>	194	7.39	193	7.41							
641.leela_s	112	281	6.07	281	6.06	<b>281</b>	<b>6.07</b>							
648.exchange2_s	112	110	26.7	<b>110</b>	<b>26.7</b>	110	26.6							
657.xz_s	112	<b>220</b>	<b>28.1</b>	221	28.0	220	28.1							

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

## 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-ic2023.2.3/lib/intel64:/home/cpu2017-1.1.9-ic2023.2.3/lib/ia32:/home/cpu2017-1.1.9-ic2023.2.3/je5.0.1-64"

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

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

sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>



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## Platform Notes

BIOS configuration:

Choose Operating Mode set to Custom Mode

CPU P-state Control set to Legacy

Sysinfo program /home/cpu2017-1.1.9-ic2023.2.3/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197  
running on localhost Thu Feb 22 13:30:06 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. `numactl --hardware`
  - 9. `/proc/meminfo`
  - 10. `who -r`
  - 11. Systemd service manager version: `systemd 249 (249.16+suse.171.gdad0071f15)`
  - 12. Failed units, from `systemctl list-units --state=failed`
  - 13. Services, from `systemctl list-unit-files`
  - 14. Linux kernel boot-time arguments, from `/proc/cmdline`
  - 15. `cpupower frequency-info`
  - 16. `sysctl`
  - 17. `/sys/kernel/mm/transparent_hugepage`
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  - 19. OS release
  - 20. Disk information
  - 21. `/sys/devices/virtual/dmi/id`
  - 22. `dmidecode`
  - 23. 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`  
13:30:06 up 3:20, 1 user, load average: 5.20, 5.96, 3.63  
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT  
root tty1 - 10:10 1:38m 1.50s 0.01s sh  
Run322-compliant-ic2023.2.3-lin-sapphirerapids-speedint-base-smt-on-20231121.sh
- 
- 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

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### Platform Notes (Continued)

```

pending signals          (-i) 4126970
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) 4126970
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
/bin/bash ./run_SD550V3_EMR.sh
sh Run322-compliant-ic2023.2.3-lin-sapphirerapids-speedint-base-smt-on-20231121.sh
runcpu --nobuild --action validate --define default-platform-flags -c
  ic2023.2.3-lin-sapphirerapids-speed-20231121.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
  ic2023.2.3-lin-sapphirerapids-speed-20231121.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/CPU2017.312/temlogs/preenv.intspeed.312.0.log --lognum 312.0 --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 5520+
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       : 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
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 2.37.4:
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

```

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### Platform Notes (Continued)

```

On-line CPU(s) list:          0-111
Vendor ID:                   GenuineIntel
Model name:                  INTEL(R) XEON(R) GOLD 5520+
CPU family:                  6
Model:                       207
Thread(s) per core:         2
Core(s) per socket:         28
Socket(s):                   2
Stepping:                    2
Frequency boost:             enabled
CPU max MHz:                 2201.0000
CPU min MHz:                 800.0000
BogoMIPS:                    4400.00
Flags:                       fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                             clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
                             lm constant_tsc art arch_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
                             sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand
                             lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cat_l2 cdp_l3
                             invpcid_single cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow
                             vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep
                             bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap
                             avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl
                             xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
                             cqm_mbm_local avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts
                             avx512vbmi umip pku ospke waitpkg avx512_vbmi2 gfni vaes vpclmulqdq
                             avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid bus_lock_detect
                             cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxldtrk pconfig
                             arch_lbr 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:                    105 MiB (2 instances)
NUMA node(s):                2
NUMA node0 CPU(s):          0-27,56-83
NUMA node1 CPU(s):          28-55,84-111
Vulnerability Itlb multihit: Not affected
Vulnerability Lltf:         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, PBRSE-eIBRS SW
                             sequence
Vulnerability Srbds:        Not affected
Vulnerability Tsx async abort: Not affected

```

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	48K	2.6M	12	Data	1	64	1	64
L1i	32K	1.8M	8	Instruction	1	64	1	64
L2	2M	112M	16	Unified	2	2048	1	64
L3	52.5M	105M	15	Unified	3	57344	1	64

8. numactl --hardware

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### Platform Notes (Continued)

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

```

available: 2 nodes (0-1)
node 0 cpus: 0-27,56-83
node 0 size: 515711 MB
node 0 free: 514045 MB
node 1 cpus: 28-55,84-111
node 1 size: 516060 MB
node 1 free: 514972 MB
node distances:
node 0 1
  0: 10 21
  1: 21 10

```

```

9. /proc/meminfo
   MemTotal:      1056535072 kB

```

```

10. who -r
    run-level 3 Feb 22 10:10

```

```

11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
    Default Target   Status
    multi-user       degraded

```

```

12. Failed units, from systemctl list-units --state=failed
    UNIT                                LOAD    ACTIVE SUB    DESCRIPTION
    * ntp_sync.service loaded failed failed ntp_sync.service

```

```

13. Services, from systemctl list-unit-files
    STATE     UNIT FILES
    enabled   YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ irqbalance issue-generator
    kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog smartd sshd
    systemd-pstore wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
    enabled-runtime systemd-remount-fs
    disabled  autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
    chronyd console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info
    firewallld gpm grub2-once haveged haveged-switch-root ipmi ipmievd issue-add-ssh-keys
    kexec-load lunmask man-db-create multipathd nfs nfs-blkmap rpcbind rpmconfigcheck rsyncd
    serial-getty@ smartd_generate_opts snmptrapd systemd-boot-check-no-failures
    systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd
    generated ntp_sync
    indirect  wickedd

```

```

14. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
    root=UUID=1f1165ee-d57c-4884-9a69-769de0319f56
    ro
    splash=silent
    mitigations=auto
    quiet
    security=apparmor

```

```

15. cpupower frequency-info
    analyzing CPU 0:

```

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### Platform Notes (Continued)

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

```

-----
16. 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
-----

```

```

-----
17. /sys/kernel/mm/transparent_hugepage
defrag          always defer+advise [advise] never
enabled         [always] advise never
hpage_pmd_size 2097152
shmem_enabled   always within_size advise [never] deny force
-----

```

```

-----
18. /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
-----

```

```

-----
19. OS release
From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 15 SP5
-----

```

```

-----
20. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2023.2.3
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sdb3       xfs   446G  42G  404G  10% /
-----

```

```

-----
21. /sys/devices/virtual/dmi/id
Vendor:          Lenovo
-----

```

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### Platform Notes (Continued)

Product: ThinkSystem SD550 V3  
Product Family: ThinkSystem  
Serial: 1234567890

#### 22. 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:

9x Samsung M321R8GA0PB0-CWMKH 64 GB 2 rank 5600, configured at 4800  
7x Samsung M321R8GA0PB0-CWMXH 64 GB 2 rank 5600, configured at 4800

#### 23. BIOS

(This section combines info from /sys/devices and dmidecode.)

BIOS Vendor: Lenovo  
BIOS Version: FNE113F-2.20  
BIOS Date: 01/02/2024  
BIOS Revision: 2.20  
Firmware Revision: 1.10

### 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 2023.2.3 Build x  
Copyright (C) 1985-2023 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 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

Fortran | 648.exchange2\_s(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

C++ benchmarks:

icpx

(Continued on next page)





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## Base Compiler Invocation (Continued)

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:

```
-w -std=c11 -m64 -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:

```
-w -std=c++14 -m64 -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:

```
-w -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
```

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>



# SPEC CPU®2017 Integer Speed Result

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## Lenovo Global Technology

ThinkSystem SD550 V3  
(2.20 GHz, Intel Xeon Gold 5520+)

SPECspeed®2017\_int\_base = 14.4

SPECspeed®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

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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