# SPEC CPU®2017 Integer Rate Result

**Lenovo Global Technology**

**ThinkSystem SR630 V3**  
(2.00 GHz, Intel Xeon Gold 5416S)

**SPECrade®2017_int_base** = **276**  
**SPECrade®2017_int_peak** = Not Run

| Copies | 0 | 30.0 | 60.0 | 90.0 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 |
|--------|---|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 500.perlbench_r | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 502.gcc_r | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 505.mcf_r | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 520.omnetpp_r | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 523.xalancbmk_r | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 525.x264_r | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 531.deepsjeng_r | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 541.leela_r | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 548.exchange2_r | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 557.xz_r | 64 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

**Hardware**

- **CPU Name:** Intel Xeon Gold 5416S  
- **Max MHz:** 4000  
- **Nominal:** 2000  
- **Enabled:** 32 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:** 30 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R, running at 4400)  
- **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 2022.1 of Intel oneAPI DPC++/C++  
  Compiler for Linux;  
  Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;  
- **Parallel:** No  
- **Firmware:** Lenovo BIOS Version ESE109L 1.10 released Jan-2023  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None  
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage
Lenovo Global Technology
ThinkSystem SR630 V3
(2.00 GHz, Intel Xeon Gold 5416S)

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

SPECrate®2017_int_base = 276
SPECrate®2017_int_peak = Not Run

Results Table

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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.xalanchmk_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.

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/cpu2017-1.1.8-ic2022.1/lib/intel64:/home/cpu2017-1.1.8-ic2022.1/lib/ia32:/home/cpu2017-1.1.8-ic2022.1/jre5.0.1-32"
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>`

**Platform Notes**

- BIOS configuration:
  - Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
  - SNC set to SNC2
  - LLC Prefetch set to Disabled
  - UPI Link Disable set to Disabled 1 Link
  - C-state set to Legacy

- Sysinfo program `/home/cpu2017-1.1.8-ic2022.1/bin/sysinfo`
- Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca61ec64d
- Running on test1 Wed Jan 18 17:30:32 2023

- SUT (System Under Test) info as seen by some common utilities.
  - For more information on this section, see [https://www.spec.org/cpu2017/Docs/config.html#sysinfo](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

- From `/proc/cpuinfo`
  - `model name : Intel(R) Xeon(R) Gold 5416S`
  - `2 "physical id"s (chips)`
  - `64 "processors"`
  - `cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)`
  - `cpu cores : 16`
  - `siblings : 32`
  - `physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15`
  - `physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15`

- 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): 64`
  - `On-line CPU(s) list: 0-63`
  - `Vendor ID: GenuineIntel`
  - `Model name: Intel(R) Xeon(R) Gold 5416S`
  - `CPU family: 6`
  - `Model: 143`
  - `Thread(s) per core: 2`
  - `Core(s) per socket: 16`
  - `Socket(s): 2`
  - `Stepping: 8`
  - `BogoMIPS: 4000.00`
Platform Notes (Continued)

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
pdpent gdtsc pep constant_tsc arch_perfmon pebs bts rep_good nopl xtopology
nonstop_tsc cpuid aperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx
smx est tm2 ssse3 sdbg fma cx16 xtrunc pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt
tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
eb cat_l1 cat_l2 cdpr cdpr invpcid_single intel_pinn cdpr sbdb mba ibrs ibp stibp
ibre_ enhanced tpr_shadow vmml flexpriority ept vpid ept_ad fsgsbased tsc_adjust bmm
hle avx2 smep bmi2 emms invpcid rtm cqm rdtscp dts acpi mmx fxsr sse sse2 ss ht
tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_capabilities
```

Virtualization: VT-x

L1d cache: 1.5 MiB (32 instances)
L1i cache: 1 MiB (32 instances)
L2 cache: 64 MiB (32 instances)
L3 cache: 60 MiB (2 instances)
NUMA node(s): 4
NUMA node0 CPU(s): 0-7, 32-39
NUMA node1 CPU(s): 8-15, 40-47
NUMA node2 CPU(s): 16-23, 48-55
NUMA node3 CPU(s): 24-31, 56-63

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
pctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and _user
pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB
filling
Vulnerability Srbds: Not affected
Vulnerability Tsz async abort: Not affected

From lscpu --cache:

```
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 1.5M 12 Data 1 64 1 64
L1i 32K 1M 8 Instruction 1 64 1 64
L2 2M 64M 16 Unified 2 2048 1 64
L3 30M 60M 15 Unified 3 32768 1 64
```

From numactl --hardware

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

```
node 0 cpus: 0 1 2 3 4 5 6 7 32 33 34 35 36 37 38 39
node 0 size: 128683 MB
node 0 free: 127983 MB
node 1 cpus: 8 9 10 11 12 13 14 15 40 41 42 43 44 45 46 47
node 1 size: 128985 MB
node 1 free: 128643 MB
node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55
node 2 size: 129019 MB
```

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Platform Notes (Continued)

node 2 free: 128706 MB
node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
node 3 size: 128991 MB
node 3 free: 128636 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

From /proc/meminfo
MemTotal: 528056172 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release*/etc/*version*/
os-release:
NAME="SLES"
VERSION="15-SP4"
VERSION_ID="15.4"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp4"

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

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapgs barriers and __user pointer sanitation
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jan 18 17:29

SPEC is set to: /home/cpu2017-1.1.8-ic2022.1

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR630 V3
Product Family: ThinkSystem
Serial: 1234567890

(Continued on next page)
Platform Notes (Continued)

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, configured at 4400
- 5x Samsung M321R4GA3BB0-CQKM G 32 GB 2 rank 4800, configured at 4400
- 10x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800, configured at 4400

BIOS:
- BIOS Vendor: Lenovo
- BIOS Version: ESE109L-1.10
- BIOS Date: 01/07/2023
- BIOS Revision: 1.10
- Firmware Revision: 1.0

(End of data from sysinfo program)

Compiler Version Notes

------------------------------------------------------------------------------------------------------------
C       | 500.perlbench_r(base) 502.qcc_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 2022.1.0 Build 20220316 Copyright (C) 1985-2022 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 2022.1.0 Build 20220316 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------------------------
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx
Lenovo Global Technology  
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| SPECrate®2017_int_base = | 276 |
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**Base Portability Flags**

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64  
502.gcc_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 -xCORE-AVX512 -O3 -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin  
-lqkmalloc

C++ benchmarks:  
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin  
-lqkmalloc

Fortran benchmarks:  
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte -auto  
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin  
-lqkmalloc

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-N.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-N.xml  
### Lenovo Global Technology

**ThinkSystem SR630 V3**  
(2.00 GHz, Intel Xeon Gold 5416S)

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<th>9017</th>
<th>Test Date:</th>
<th>Jan-2023</th>
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<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Feb-2023</td>
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<td>Tested by:</td>
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<td>Software Availability:</td>
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**SPECrate®2017_int_base = 276**  
**SPECrate®2017_int_peak = Not Run**

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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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