



# SPEC CPU®2017 Integer Rate Result

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## Lenovo Global Technology

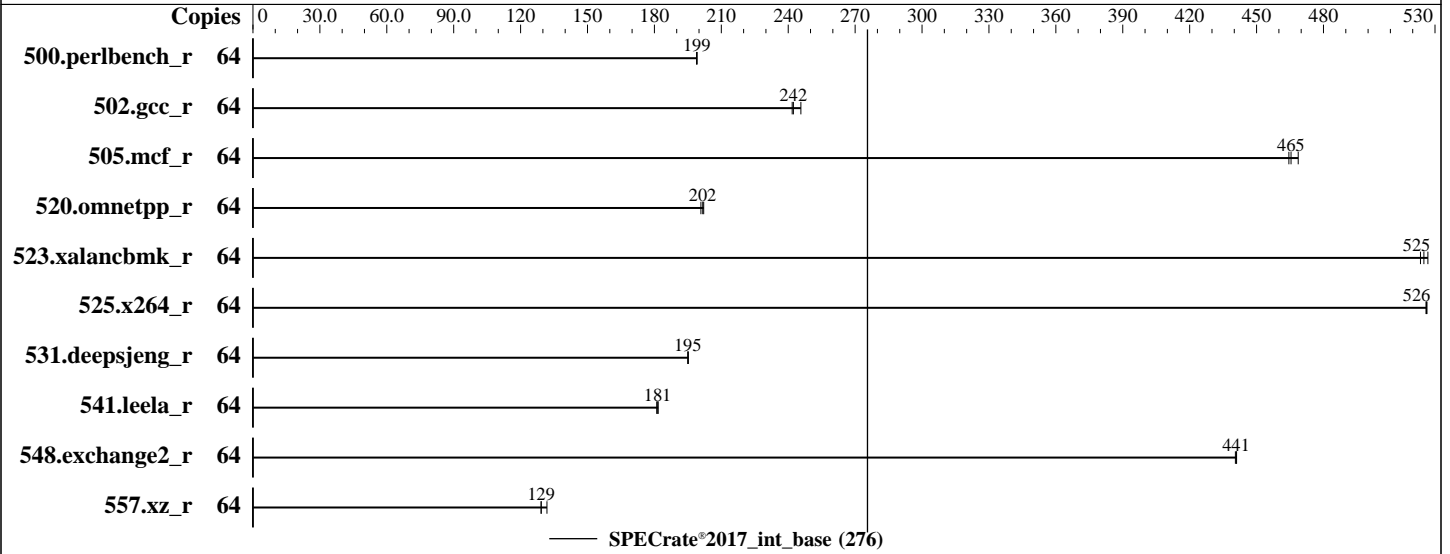
ThinkSystem SR630 V3  
(2.00 GHz, Intel Xeon Gold 5416S)

SPECrate®2017\_int\_base = 276

SPECrate®2017\_int\_peak = Not Run

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

**Test Date:** Jan-2023  
**Hardware Availability:** Feb-2023  
**Software Availability:** Jun-2022



### 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  
File System: xfs  
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



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	64	512	199	512	199	<b>512</b>	<b>199</b>							
502.gcc_r	64	369	246	<b>374</b>	<b>242</b>	375	242							
505.mcf_r	64	<b>222</b>	<b>465</b>	221	469	223	464							
520.omnetpp_r	64	415	202	<b>416</b>	<b>202</b>	418	201							
523.xalancbmk_r	64	<b>129</b>	<b>525</b>	128	527	129	523							
525.x264_r	64	213	526	<b>213</b>	<b>526</b>	213	526							
531.deepsjeng_r	64	<b>376</b>	<b>195</b>	376	195	376	195							
541.leela_r	64	585	181	<b>584</b>	<b>181</b>	583	182							
548.exchange2_r	64	381	440	380	441	<b>380</b>	<b>441</b>							
557.xz_r	64	524	132	535	129	<b>535</b>	<b>129</b>							

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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.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](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/je5.0.1-32"
MALLOC_CONF = "retain:true"
```



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### 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.  
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 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 982a61ec0915b55891ef0e16acafc64d  
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>

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

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### 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 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 intel\_ppin 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 split\_lock\_detect 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\_l1d 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 prctl 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 Tsx 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

/proc/cpuinfo cache data  
cache size : 30720 KB

From numactl --hardware

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

available: 4 nodes (0-3)  
 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/swappg
barriers and __user pointer
sanitization
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
Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb2 xfs 894G 56G 839G 7% /

```

```

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

```

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## 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-CQKMG 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.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 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



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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>  
[http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64\\_revA.html](http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.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>  
[http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64\\_revA.xml](http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml)



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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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