# SPEC CPU®2017 Integer Rate Result

## Lenovo Global Technology

ThinkSystem SR650  
(3.60 GHz, Intel Xeon Gold 6256)  

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<th>9017</th>
<th>Test Date:</th>
<th>Jun-2020</th>
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<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Mar-2020</td>
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<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>Apr-2020</td>
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### Results

**SPECrate®2017_int_base = 209**

**SPECrate®2017_int_peak = Not Run**

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### Hardware

- **CPU Name:** Intel Xeon Gold 6256  
- **Max MHz:** 4500  
- **Nominal:** 3600  
- **Enabled:** 24 cores, 2 chips, 2 threads/core  
- **Orderable:** 1.2 chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 33 MB I+D on chip per core  
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)  
- **Storage:** 1 x 800 GB SATA SSD  
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP1 (x86_64)  
- **Kernel:** 4.12.14-195-default  
- **Compiler:** C/C++: Version 19.1.1.217 of Intel C/C++  
- **Compiler for Linux:** Intel Fortran  
- **Compiler for Linux:** Compiler for Linux  
- **Parallel:** No  
- **Firmware:** Lenovo BIOS Version IVE155L 2.61 released May-2020  
- **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
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Tested by: Lenovo Global Technology
Software Availability: Apr-2020

Results Table

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</table>

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

Compiler Notes
The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.
The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

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/cpu2017-1.1.0-ic19.1.1/lib/intel64:/home/cpu2017-1.1.0-ic19.1.1/lib/ia32:/home/cpu2017-1.1.0-ic19.1.1/je5.0.1-32"
MALLOC_CONF = "retain:true"
General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB 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
    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.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) 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
MONITOR/MWAIT set to Enable
SNC set to Enable
DCU Streamer Prefetcher set to Disable
LLC dead line alloc set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.1.1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edblle6e46a485a0011
running on linux-xpyz Thu Jun  4 19:39:18 2020

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 6256 CPU @ 3.60GHz
    2 "physical id"s (chips)
    48 "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 : 12
    siblings : 24
    physical 0: cores 2 4 9 10 13 16 19 21 24 25 27 28
    physical 1: cores 0 1 3 4 9 10 13 16 18 19 27 28
```

(Continued on next page)
Platform Notes (Continued)

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- Address sizes: 46 bits physical, 48 bits virtual
- CPU(s): 48
- On-line CPU(s) list: 0-47
- Thread(s) per core: 2
- Core(s) per socket: 12
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6256 CPU @ 3.60GHz
- Stepping: 7
- CPU MHz: 3600.000
- CPU max MHz: 4500.0000
- CPU min MHz: 1200.0000
- BogoMIPS: 7200.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 33792K
- NUMA node0 CPU(s): 0,2,3,5,8,9,24,26,27,29,32,33
- NUMA node1 CPU(s): 1,4,6,7,10,11,25,28,30,31,34,35
- NUMA node2 CPU(s): 12,13,16,17,19,20,36,37,39,41,43,44
- NUMA node3 CPU(s): 14,15,18,21-23,38,39,42,45-47
- 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
- aperfmpref pfni pclmuldq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
- xtrr 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 cdp_l3
- invpcid_single intel_pmm ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
- flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrm invpcid rtm
- cmx mrpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
- avx512bw avx512vl xsaveopt xsavec xgetbv1 xsavecf cqm_llc cqm_occup_llc cqm_mbb_total
- cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_lld
- arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a

(Continued on next page)
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SPEC CPU®2017 Integer Rate Result
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SPECrates®2017_int_base = 209
SPECrates®2017_int_peak = Not Run

CPU2017 License: 9017
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Hardware Availability: Mar-2020
Software Availability: Apr-2020

Platform Notes (Continued)

 physical chip.
 available: 4 nodes (0-3)
  node 0 cpus: 0 2 3 5 8 9 24 26 27 29 32 33
  node 0 size: 193152 MB
  node 0 free: 192663 MB
  node 1 cpus: 1 4 6 7 10 11 25 28 30 31 34 35
  node 1 size: 193533 MB
  node 1 free: 193251 MB
  node 2 cpus: 12 13 16 17 19 20 36 37 40 41 43 44
  node 2 size: 193504 MB
  node 2 free: 193289 MB
  node 3 cpus: 14 15 18 21 22 23 38 39 42 45 46 47
  node 3 size: 193532 MB
  node 3 free: 193290 MB
  node distances:
   node 0 1 2 3
   0: 10 11 21 21
   1: 11 10 21 21
   2: 21 21 10 11
   3: 21 21 11 10

  From /proc/meminfo
  MemTotal: 792292288 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

  From /etc/*release* /etc/*version*
  os-release:
  NAME="SLES"
  VERSION="15-SP1"
  VERSION_ID="15.1"
  PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
  ID="sles"
  ID_LIKE="suse"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:15:sp1"

  uname -a:
  Linux linux-xyyz 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
  x86_64 x86_64 x86_64 GNU/Linux

  Kernel self-reported vulnerability status:
  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

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Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1): via prctl and seccomp
Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Jun 4 19:37

SPEC is set to: /home/cpu2017-1.1.0-ic19.1.1
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 737G 63G 675G 9% /

BIOS: Lenovo -[IVE155L-2.61]- 05/20/2020
Vendor: Lenovo
Product: ThinkSystem SR650 -[7X05RCZ000]-
Product Family: ThinkSystem
Serial: 1234567890

Additional information from dmidecode 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:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

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) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C++
| 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
  541.leela_r(base)

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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

**SPECrate®2017_int_base = 209**  
**SPECrate®2017_int_peak = Not Run**

### Compiler Version Notes (Continued)

Base Compiler Invocation

- **C benchmarks:** icc
- **C++ benchmarks:** icpc
- **Fortran benchmarks:** ifort

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

- m64 -qnextgen -std=c11
- W1, -plugin-opt=x86-branches-within-32B-boundaries -Wl,-z,muldefs
- xCORE-AVX512 -03 -ffast-math -flto -mfpmath=sse -funroll-loops
- fuse=ld=gold -qopt-mem-layout-trans=4
- L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin

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**SPECrater®2017_int_peak = Not Run**

**Base Optimization Flags (Continued)**

C benchmarks (continued):
- `-lqkmalloc`

C++ benchmarks:
- `-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries`
- `-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse`
- `-funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin -lqkmalloc`

Fortran benchmarks:
- `-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
- `-xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs -align array32byte -auto`
- `-mbranches-within-32B-boundaries`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin -lqkmalloc`

The flags files that were used to format this result can be browsed at:

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-CLX-H.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 v1.1.0 on 2020-06-04 07:39:18-0400.
Originally published on 2020-06-23.