# SPEC CPU®2017 Integer Speed Result

## Lenovo Global Technology

**ThinkSystem SR850 V2**  
(2.40 GHz, Intel Xeon Gold 5320H)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>11.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Jan-2021  
**Hardware Availability:** Nov-2020  
**Software Availability:** Aug-2020

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base (11.9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>80</td>
<td>7.22</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>80</td>
<td>10.8</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>80</td>
<td>18.9</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>80</td>
<td>10.1</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>80</td>
<td>15.1</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>80</td>
<td>17.2</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>80</td>
<td>6.16</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>80</td>
<td>5.16</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>80</td>
<td>18.2</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>80</td>
<td>25.6</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 5320H  
- **Max MHz:** 4200  
- **Nominal:** 2400  
- **Enabled:** 80 cores, 4 chips  
- **Orderable:** 2.4 chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 1 MB I+D on chip per core  
- **L3:** 27.5 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 1536 GB (48 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.2 (Ootpa)  
- **Kernel:** 4.18.0-193.el8.x86_64  
- **Compiler:** C/C++: Version 19.1.2.275 of Intel C/C++ Compiler for Linux; Fortran: Version 19.1.2.275 of Intel Fortran Compiler for Linux  
- **Parallel:** Yes  
- **Firmware:** Lenovo BIOS Version M5E107I 1.01 released Nov-2020  
- **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 set to prefer performance at the cost of additional power usage
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>600.perlbench_s</td>
<td>80</td>
<td>248</td>
<td>7.14</td>
<td>246</td>
<td>7.22</td>
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<td>245</td>
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<tr>
<td>602.gcc_s</td>
<td>80</td>
<td>370</td>
<td>10.8</td>
<td>370</td>
<td>10.8</td>
<td></td>
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<td>248</td>
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<td>18.9</td>
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<td>251</td>
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<td>162</td>
<td>10.1</td>
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<td>15.1</td>
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<tr>
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<td>102</td>
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<td></td>
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<td>233</td>
<td>6.16</td>
<td>232</td>
<td>6.17</td>
<td></td>
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<td>80</td>
<td>331</td>
<td>5.15</td>
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<td>5.16</td>
<td></td>
<td>330</td>
<td>5.16</td>
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<td>80</td>
<td>161</td>
<td>18.2</td>
<td>161</td>
<td>18.2</td>
<td></td>
<td>162</td>
<td>18.2</td>
<td></td>
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<tr>
<td>657.xz_s</td>
<td>80</td>
<td>241</td>
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<td></td>
<td>241</td>
<td>25.6</td>
<td></td>
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</tbody>
</table>

SPECspeed®2017_int_base = 11.9
SPECspeed®2017_int_peak = Not Run

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/cpu2017-1.1.0-ic19.1u2/lib/intel64:/home/cpu2017-1.1.0-ic19.1u2/j
e5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

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
Filesyste 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.
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Lenovo Global Technology
ThinkSystem SR850 V2
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## General Notes (Continued)

jemalloc, a general purpose malloc implementation  
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  

## Platform Notes

**BIOS configuration:**  
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode  
C-States set to Autonomous  
Hyper-Threading set to Disabled  

Sysinfo program /home/cpu2017-1.1.0-ic19.1u2/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011  
running on localhost.localdomain Sun Jan 3 13:03:10 2021  

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 5320H CPU @ 2.40GHz  
  * 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: 20  
  * siblings: 20  
  * physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28  
  * physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28  
  * physical 2: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28  
  * physical 3: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:

* Architecture: x86_64  
* CPU op-mode(s): 32-bit, 64-bit  
* Byte Order: Little Endian  
* CPU(s): 80  
* On-line CPU(s) list: 0-79  
* Core(s) per socket: 20  
* Socket(s): 4  
* VENDOR node(s): GenuineIntel  
* CPU family: 6  
* Model: 85  
* Model name: Intel(R) Xeon(R) Gold 5320H CPU @ 2.40GHz

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

- Stepping: 11
- CPU MHz: 3366.614
- CPU max MHz: 4200.0000
- CPU min MHz: 1000.0000
- BogoMIPS: 4800.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 28160K
- NUMA node0 CPU(s): 0-19
- NUMA node1 CPU(s): 20-39
- NUMA node2 CPU(s): 40-59
- NUMA node3 CPU(s): 60-79
- 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 pdelgb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf 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 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_ppin ssbd mba ibrs ibpb ibrs_enabled tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmq mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local avx512_bf16 dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

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 8 9 10 11 12 13 14 15 16 17 18 19
  - node 0 size: 386656 MB
  - node 0 free: 386439 MB
  - node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
  - node 1 size: 387067 MB
  - node 1 free: 386857 MB
  - node 2 cpus: 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59
  - node 2 size: 387067 MB
  - node 2 free: 386874 MB
  - node 3 cpus: 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  - node 3 size: 387039 MB
  - node 3 free: 386260 MB
  - node distances:
    - node 0 1 2 3

(Continued on next page)
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<td>Software Availability:</td>
<td>Aug-2020</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

0:  10  20  20  20  
1:  20  10  20  20  
2:  20  20  10  20  
3:  20  20  20  10  

From /proc/meminfo  
MemTotal: 1584978280 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*  
os-release:  
NAME="Red Hat Enterprise Linux"  
VERSION="8.2 (Ootpa)"  
ID="r9el"  
ID_LIKE="fedora"  
VERSION_ID="8.2"  
PLATFORM_ID="platform:el8"  
PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"  
ANSI_COLOR="0;31"  
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)  
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)  
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga  
uname -a:  
Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020  
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:  

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 sanitization  
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling  
tsx_async_abort: Not affected  
run-level 3 Jan 3 13:01  
SPEC is set to: /home/cpu2017-1.1.0-ic19.1u2  

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>838G</td>
<td>35G</td>
<td>803G</td>
<td>5%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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spec

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Platform Notes (Continued)

From /sys/devices/virtual/dmi/id
BIOS: Lenovo M5E107I-1.01 11/02/2020
Vendor: Lenovo
Product: ThinkSystem SR850 V2
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:
48x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200

(End of data from sysinfo program)
Memory on this system run at 2666 MHz due to CPU limitation.

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) C Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
| C++     | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) |
|         | 641.leela_s(base)  |
==============================================================================
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version
19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
| Fortran | 648.exchange2_s(base)  |
==============================================================================
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

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:
-m64 -qnextgen -std=c11
-Wl, -plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX2 -O3 -ffast-math -ftlo -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -ftlo -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX2
-O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte

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Base Optimization Flags (Continued)
Fortran benchmarks (continued):
-mbranches-within-32B-boundaries

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/Intel-ic19.1u1-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Cooperlake-A.xml

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