# SPEC CPU®2017 Integer Speed Result

## Lenovo Global Technology

ThinkSystem SR850 V2  
(2.80 GHz, Intel Xeon Gold 6328H)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>11.9</th>
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<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
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**CPU2017 License:** 9017  
**Test Date:** Dec-2020  
**Test Sponsor:** Lenovo Global Technology  
**Hardware Availability:** Nov-2020  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Aug-2020

### Threads

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<tr>
<th>Threads</th>
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<tbody>
<tr>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>600.perlbench_s</td>
<td>64</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>64</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>64</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>64</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>64</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>64</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>64</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>64</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>64</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>64</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6328H  
- **Max MHz:** 4300  
- **Nominal:** 2800  
- **Enabled:** 64 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:** 22 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 1536 GB (48 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None  
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage

### 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
### Lenovo Global Technology

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**SPECspeed®2017_int_base =** 11.9

**SPECspeed®2017_int_peak =** Not Run

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#### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
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<td>7.36</td>
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<td>602.gcc_s</td>
<td>64</td>
<td>365</td>
<td>10.9</td>
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<td>10.7</td>
<td>371</td>
<td>10.7</td>
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<tr>
<td>605.mcf_s</td>
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<td>19.3</td>
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<tr>
<td>620.omnetpp_s</td>
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<tr>
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<td>15.2</td>
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<td>15.3</td>
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<tr>
<td>625.x264_s</td>
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<td>17.4</td>
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<td>17.4</td>
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<td>6.31</td>
<td>227</td>
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<tr>
<td>641.leela_s</td>
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<td>323</td>
<td>5.29</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>64</td>
<td>158</td>
<td>18.6</td>
<td>158</td>
<td>18.7</td>
<td>158</td>
<td>18.6</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>64</td>
<td>242</td>
<td>25.5</td>
<td>240</td>
<td>25.8</td>
<td>240</td>
<td>25.8</td>
</tr>
</tbody>
</table>

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

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#### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

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#### Environment Variables Notes

Environment variables set by runcpu before the start of the run:

- `KMP_AFFINITY = "granularity=fine,scatter"
- `LD_LIBRARY_PATH = 
  
/proc/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

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.
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ThinkSystem SR850 V2
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SPECSpeed®2017_int_base = 11.9
SPECSpeed®2017_int_peak = Not Run

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 Autonomus
Hyper-Threading set to Disabled

Sysinfo program /home/cpu2017-1.1.0-ic19.1u2/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed8e6464a485a0011
running on localhost.localdomain Wed Dec 30 15:33:27 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 6328H CPU @ 2.80GHz
  4 "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 : 16
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
physical 2: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 3: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu:
Architecture:       x86_64
CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              64
On–line CPU(s) list: 0–63
Thread(s) per core:  1
Core(s) per socket:  16
Socket(s):           4
NUMA node(s):        4
Vendor ID:           GenuineIntel
CPU family:          6
Model:               85
Model name:          Intel(R) Xeon(R) Gold 6328H CPU @ 2.80GHz

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

```
Stepping:            11
CPU MHz:             2947.612
CPU max MHz:         4300.0000
CPU min MHz:         1000.0000
BogoMIPS:            5600.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            22528K
NUMA node0 CPU(s):   0-15
NUMA node1 CPU(s):   16-31
NUMA node2 CPU(s):   32-47
NUMA node3 CPU(s):   48-63
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 pdpelgb 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 fl64c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsavec x salv xsaves cqm_llc cqm_occup_llc cqm_mbttotal
cqm_mbm_local avx512_bf16 dtherm ida arat pln pts pku ospke avx512_vnni md_clear
flush_lld arch_capabilities

/platform/cpuinfo cache data
       cache size : 22528 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 8 9 10 11 12 13 14 15
      node 0 size: 386657 MB
      node 0 free: 386455 MB
      node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
      node 1 size: 387068 MB
      node 1 free: 386788 MB
      node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
      node 2 size: 387040 MB
      node 2 free: 386512 MB
      node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
      node 3 size: 387067 MB
      node 3 free: 386720 MB
      node distances:
          node 0 1 2 3
```

(Continued on next page)
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**SPEC speed® 2017 Int_base =** 11.9

**SPEC speed® 2017 Int_peak =** Not Run

### 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: 1584981672 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From `/etc/*release` /`/etc/*version`
- NAME="Red Hat Enterprise Linux"
- VERSION="8.2 (Ootpa)"
- ID="rhel"
- 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 Dec 30 15:29

**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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## 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 2933 MHz due to CPU limitation.

## Compiler Version Notes

### C

| 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++

| 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

| 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.
Base Compiler Invocation

C benchmarks:
- icc

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort

Base Portability Flags

```
600.perlbmk_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbk_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 -ftio -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 -ftio -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:

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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 2020-12-30 02:33:27-0500.  
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