## Lenovo Global Technology

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

<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>
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**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>
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<th>Threads</th>
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<tr>
<td>600.perlbench_s</td>
<td>64</td>
</tr>
<tr>
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<tr>
<td>605.mcf_s</td>
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<tr>
<td>620.omnetpp_s</td>
<td>64</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>64</td>
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<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>
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</tr>
<tr>
<td>657.xz_s</td>
<td>64</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_int_base (11.9)

#### Hardware

- **CPU Name:** Intel Xeon Gold 6328HL  
- **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  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 22 MB I+D on chip per chip  
- **Memory:** 1536 GB (48 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)  
- **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
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Results Table

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<thead>
<tr>
<th>Benchmark</th>
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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
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.
(Continued on next page)
## Lenovo Global Technology

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

### SPECspeed®2017 Integer Speed Result

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</table>

**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 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 21:02:16 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 6328HL 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 6328HL CPU @ 2.80GHz

(Continued on next page)
Lenovo Global Technology
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SPECSpeed®2017_int_base = 11.9
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Platform Notes (Continued)

Stepping: 11
CPU MHz: 2751.33
CPU max MHz: 4300.00
CPU min MHz: 1000.00
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 pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrn pdcm pcid dca sse4_1 l sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx fl64 rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_pinn 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 xsaves cqm_llc cqm_occ_cq cqm_mbb_total
cqm_mbb_local avx512_bf16 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
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: 386456 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: 386746 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: 386554 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: 386758 MB
node distances:
node 0 1 2 3

(Continued on next page)
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**SPECSpeed®2017_int_base = 11.9**

**SPECSpeed®2017_int_peak = Not Run**

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#### 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: 1584981372 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
- os-release:
  - 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 Jan 3 21:01

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/sda2</td>
<td>xfs</td>
<td>838G</td>
<td>42G</td>
<td>797G</td>
<td>5%</td>
<td>/home</td>
</tr>
</tbody>
</table>

(Continued on next page)
**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: none

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**

```markdown
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.
```

```markdown
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.
```

```markdown
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 -flto -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 -flto -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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