Lenovo Global Technology
ThinkSystem SR850P
(2.30 GHz, Intel Xeon Gold 5218B)

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

Lenovo Global Technology

SPEC sped2017_int_base = 10.7
SPEC sped2017_int_peak = Not Run

Test Date: Dec-2020
Hardware Availability: Jun-2020
Software Availability: Aug-2020

Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECsped2017_int_base (10.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>64</td>
<td>6.71</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>64</td>
<td>9.45</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>64</td>
<td>17.3</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>64</td>
<td>9.26</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>64</td>
<td>13.6</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>64</td>
<td>13.7</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>64</td>
<td>5.69</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>64</td>
<td>4.82</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>64</td>
<td>16.5</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>64</td>
<td>22.9</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Gold 5218B
Max MHz: 3900
Nominal: 2300
Enabled: 64 cores, 4 chips
Orderable: 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 2Rx4 PC4-2933Y-R, running at 2666)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.0
(Ootpa)
Kernel 4.18.0-80.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 TEE156L 2.61 released May-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
SPEC CPU®2017 Integer Speed Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR850P
(2.30 GHz, Intel Xeon Gold 5218B)

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

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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Base</td>
<td>Peak</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>600.perlbench_s</td>
<td>64</td>
<td>264</td>
<td>6.71</td>
<td>265</td>
<td>6.70</td>
<td>265</td>
<td>6.71</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>64</td>
<td>424</td>
<td>9.39</td>
<td>417</td>
<td>9.55</td>
<td>421</td>
<td>9.45</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>64</td>
<td>271</td>
<td>17.4</td>
<td>273</td>
<td>17.3</td>
<td>274</td>
<td>17.2</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>64</td>
<td>176</td>
<td>9.26</td>
<td>176</td>
<td>9.28</td>
<td>179</td>
<td>9.12</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>64</td>
<td>104</td>
<td>13.7</td>
<td>104</td>
<td>13.6</td>
<td>104</td>
<td>13.6</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>64</td>
<td>128</td>
<td>13.8</td>
<td>128</td>
<td>13.7</td>
<td>128</td>
<td>13.7</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>64</td>
<td>252</td>
<td>5.69</td>
<td>252</td>
<td>5.69</td>
<td>251</td>
<td>5.70</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>64</td>
<td>354</td>
<td>4.82</td>
<td>354</td>
<td>4.82</td>
<td>354</td>
<td>4.82</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>64</td>
<td>178</td>
<td>16.5</td>
<td>178</td>
<td>16.5</td>
<td>180</td>
<td>16.3</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>64</td>
<td>270</td>
<td>22.9</td>
<td>269</td>
<td>22.9</td>
<td>269</td>
<td>23.0</td>
</tr>
</tbody>
</table>

SPECspeed®2017_int_base = 10.7
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 eup.0.1-64"
MALLOCONF = "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 SR850P
(2.30 GHz, Intel Xeon Gold 5218B)

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
MONITOR/MWAIT set to Enable
Hyper-Threading set to Disable
DCU Streamer Prefetcher set to Disable
Patrol Scrub set to Disable
LLC dead line alloc set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.1u2/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed61e6464a485a0011
running on localhost.localdomain Fri Dec 18 18:03:04 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 5218 CPU @ 2.30GHz
 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

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR850P
(2.30 GHz, Intel Xeon Gold 5218B)

SPECspeed®2017_int_base = 10.7
SPECspeed®2017_int_peak = Not Run

Platform Notes (Continued)

CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5218 CPU @ 2.30GHz
Stepping: 6
CPU MHz: 2759.534
CPU max MHz: 3900.0000
CPU min MHz: 1000.0000
BogoMIPS: 4600.00
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 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 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 xsvav 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 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occuup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni flush_lld

/proc/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: 386686 MB
    node 0 free: 386343 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: 386386 MB
    node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
    node 2 size: 387068 MB
    node 2 free: 386704 MB
    node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
    node 3 size: 387043 MB

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR850P
(2.30 GHz, Intel Xeon Gold 5218B)

SPECspeed®2017_int_base = 10.7
SPECspeed®2017_int_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Dec-2020
Tested by: Lenovo Global Technology
Hardware Availability: Jun-2020
Software Availability: Aug-2020

Platform Notes (Continued)

node 3 free: 386422 MB
node distances:
node 0 1 2 3
0: 10 21 21 31
1: 21 10 31 21
2: 21 31 10 21
3: 31 21 21 10

From /proc/meminfo
MemTotal: 1585015200 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.0 (Ootpa)"
ID=\"rhel\"
ID_LIKE=\"fedora\"
VERSION_ID=\"8.0\"
PLATFORM_ID=\"platform:el8\"
PRETTY_NAME=\"Red Hat Enterprise Linux 8.0 (Ootpa)\"
ANSI_COLOR=\"0;31\"
redhat-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.0:ga

uname -a:
Linux localhost.localdomain 4.18.0-80.el8.x86_64 #1 SMP Wed Mar 13 12:02:46 UTC 2019
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: No status reported
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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Dec 18 17:58

SPEC is set to: /home/cpu2017-1.1.0-ic19.1u2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 839G 65G 774G 8% /home

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR850P
(2.30 GHz, Intel Xeon Gold 5218B)

SPECSpeed®2017_int_base = 10.7
SPECSpeed®2017_int_peak = Not Run

Platform Notes (Continued)

From /sys/devices/virtual/dmi/id
BIOS: Lenovo -[TEE156L-2.61]- 05/20/2020
Vendor: Lenovo
Product: ThinkSystem SR850P -[7D2HCTO1WW]-
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 M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
The marketing name for the processor in this result, which appears in the CPU name and hardware
model areas, is different from sysinfo because a pre-production processor was used. The
pre-production processor differs from the production processor in name only.

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.

(Continued on next page)
**SPEC CPU®2017 Integer Speed Result**

Lenovo Global Technology

ThinkSystem SR850P
(2.30 GHz, Intel Xeon Gold 5218B)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>10.7</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  
**Test Date:** Dec-2020  
**Hardware Availability:** Jun-2020  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Aug-2020

---

**Compiler Version Notes (Continued)**

---

**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  
-W1,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs  
-xCORE-AVX512 -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  
-W1,-z,muldefs -xCORE-AVX512 -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

(Continued on next page)
Lenovo Global Technology  
ThinkSystem SR850P  
(2.30 GHz, Intel Xeon Gold 5218B)  

SPECspeed®2017_int_base = 10.7
SPECspeed®2017_int_peak = Not Run

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

Test Date: Dec-2020  
Hardware Availability: Jun-2020  
Software Availability: Aug-2020

Base Optimization Flags (Continued)

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX512
-O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-mbranches-within-32B-boundaries

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-CLX-I.html

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-CLX-I.xml