## Lenovo Global Technology

**ThinkSystem SN850**  
*(3.60 GHz, Intel Xeon Gold 6244)*

### SPECspeed® 2017_fp_base = 160  
**SPECspeed® 2017_fp_peak = Not Run**

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed® 2017_fp_base (160)</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>160</strong></td>
</tr>
</tbody>
</table>

### Hardware

**CPU Name:** Intel Xeon Gold 6244  
**Max MHz:** 4400  
**Nominal:** 3600  
**Enabled:** 32 cores, 4 chips, 2 threads/core  
**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:** 24.75 MB I+D on chip per chip  
**Other:** None  
**Memory:** 768 GB (48 x 16 GB 2Rx8 PC4-2933Y-R)  
**Storage:** 800 GB tmpfs  
**Other:** None

### Software

**OS:** Red Hat Enterprise Linux Server release 7.6 (Maipo)  
Kernel 3.10.0-957.el7.x86_64  
**Compiler:**  
C/C++: Version 19.0.4.227 of Intel  
**Firmware:** Lenovo BIOS Version IVE142E 2.30 released Aug-2019 tested as IVE141E 2.30 Jul-2019  
**File System:** tmpfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** Not Applicable  
**Other:** None  
**Power Management:** Disable
Lenovo Global Technology
ThinkSystem SN850
(3.60 GHz, Intel Xeon Gold 6244)

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

Test Date: Oct-2019
Hardware Availability: Apr-2019
Software Availability: Aug-2019

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></td>
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<td>628.pop2_s</td>
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<td>64.7</td>
<td>187</td>
<td>63.7</td>
<td>185</td>
<td>64.3</td>
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<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>107</td>
<td>134</td>
<td>107</td>
<td>134</td>
<td></td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
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<td>72.8</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>83.3</td>
<td>109</td>
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<td>115</td>
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<tr>
<td>654.roms_s</td>
<td>32</td>
<td>74.9</td>
<td>210</td>
<td>74.1</td>
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</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 160
SPECspeed®2017_fp_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"
Tmpfs filesystem can be set with:
  mount -t tmpfs -o size=800g tmpfs /home
Process tuning setting:
  echo 50000 > /proc/sys/kernel/sched_cfs_bandwidth_slice_us

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
  KMP_AFFINITY = "granularity=fine,compact,1,0"
  LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u4/lib/intel64"
  OMP_STACKSIZE = "192M"

General Notes
Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesysytem 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 SN850
(3.60 GHz, Intel Xeon Gold 6244)

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

General Notes (Continued)

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
Memory Power Management set to Automatic
MONITOR/MWAIT set to Enable
Trusted Execution Technology set to Enable
SNC set to Enable
Stale AtoS set to Enable

Sysinfo program /home/cpu2017-1.1.0-ic19.0u4/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbe1e6e46a485a0011
running on localhost.localdomain Fri Oct 25 04:36:21 2019

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 6244 CPU @ 3.60GHz
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 : 8
siblings : 16
physical 0: cores 4 8 17 18 19 24 25 27
physical 1: cores 2 3 4 8 17 20 24 26
physical 2: cores 2 4 9 20 24 25 26 27
physical 3: cores 2 3 17 18 19 20 24 25
```

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: 2
Core(s) per socket: 8
Socket(s): 4
```

(Continued on next page)
# Lenovo Global Technology

**ThinkSystem SN850**

(3.60 GHz, Intel Xeon Gold 6244)

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<td>Apr-2019</td>
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<td>Software Availability:</td>
<td>Aug-2019</td>
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</table>

## Platform Notes (Continued)

- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6244 CPU @ 3.60GHz
- Stepping: 6
- CPU MHz: 3600.000
- BogoMIPS: 7200.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 25344K
- NUMA node0 CPU(s): 0-7,32-39
- NUMA node1 CPU(s): 8-15,40-47
- NUMA node2 CPU(s): 16-23,48-55
- NUMA node3 CPU(s): 24-31,56-63

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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
- aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
- fma cx16 xtpr pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
- xsave avx f16c rdrand lahf_lm abm 3nowprefetch ebp cat_13 cdp l3 intel_pni
- intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi 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 avx512cd avx512bw avx512vl xsaveopt
- xsave xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln
- pts pku ospke avx512_vnni spec_ctrl intel_stibp 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 32 33 34 35 36 37 38 39
node 0 size: 196277 MB
node 0 free: 191733 MB
node 1 cpus: 8 9 10 11 12 13 14 15 40 41 42 43 44 45 46 47
node 1 size: 196608 MB
node 1 free: 187931 MB
node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55
node 2 size: 196608 MB
node 2 free: 191542 MB
node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
node 3 size: 196608 MB
node 3 free: 183726 MB
```

(Continued on next page)
### Lenovo Global Technology

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</table>

**SPECspeed®2017_fp_base = 160**  
**SPECspeed®2017_fp_peak = Not Run**

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### Platform Notes (Continued)

```
node distances:
node   0   1   2   3
 0:  10  21  21  21
 1:  21  10  21  21
 2:  21  21  10  21
 3:  21  21  21  10
```

From /proc/meminfo

- MemTotal: 792236448 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*

- NAME="Red Hat Enterprise Linux Server"
- VERSION="7.6 (Maipo)"
- ID="rhel"
- ID_LIKE="fedora"
- VARIANT="Server"
- VARIANT_ID="server"
- VERSION_ID="7.6"
- PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"

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: Load fences, __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS

run-level 3 Oct 25 04:34

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u4

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use% Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>tmpfs</td>
<td>tmpfs</td>
<td>800G</td>
<td>8.3G</td>
<td>792G</td>
<td>2% /home</td>
</tr>
</tbody>
</table>
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN850
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SPECspeed®2017 fp_base = 160
SPECspeed®2017 fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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Test Date: Oct-2019
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Platform Notes (Continued)

From /sys/devices/virtual/dmi/id
BIOS: Lenovo -[IVE141E-2.30]- 07/02/2019
Vendor: Lenovo
Product: Lenovo ThinkSystem SN850 -[7X15NVZ000]-
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 M393A2K43CB2-CVF 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
==============================================================================
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
Fortran         | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
==============================================================================
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
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Copyright 2017-2019 Standard Performance Evaluation Corporation

Compiler Version Notes (Continued)

Fortran, C | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume bytelecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
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**Base Optimization Flags**

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

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-F.html

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-F.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 2019-10-24 16:36:20-0400.
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