### Lenovo Global Technology

**ThinkSystem SR850**

(3.60 GHz, Intel Xeon Gold 6244)

<table>
<thead>
<tr>
<th>CPU2017 License: 9017</th>
<th>Test Date: Nov-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: Lenovo Global Technology</td>
<td>Hardware Availability: Apr-2019</td>
</tr>
<tr>
<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: May-2019</td>
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</table>

---

### SPECspeed®2017_fp_base = 160

SPECspeed®2017_fp_peak = Not Run

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### Hardware

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>130</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>146</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>129</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>94.4</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>60.9</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>254</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>246</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>113</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>246</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>130</td>
</tr>
</tbody>
</table>

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### Software

- **OS:** SUSE Linux Enterprise Server 12 SP4 (x86_64)
  - Kernel 4.12.14-94.41-default
- **Compiler:**
  - C/C++: Version 19.0.4.227 of Intel
  - Fortran: Version 19.0.4.227 of Intel Fortran
- **Parallel:** Yes
- **Firmware:**
  - Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE141E 2.30 Jul-2019
- **File System:** btrfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Power Management:** Disable
Lenovo Global Technology
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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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<tbody>
<tr>
<td>603.bwaves_s</td>
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<td>139</td>
<td>121</td>
<td>138</td>
<td>121</td>
<td>138</td>
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<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>35.9</td>
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<td>621.wrf_s</td>
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<tr>
<td>627.cam4_s</td>
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<td>93.4</td>
<td>94.9</td>
<td>94.5</td>
<td>93.8</td>
<td>93.9</td>
<td>94.4</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>195</td>
<td>61.0</td>
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<td>60.9</td>
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<td>638.imagick_s</td>
<td>32</td>
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<td>130</td>
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<tr>
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<td>68.7</td>
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<td>68.8</td>
<td>254</td>
<td>68.9</td>
<td>254</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>112</td>
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<td>113</td>
<td>80.5</td>
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<tr>
<td>654.roms_s</td>
<td>32</td>
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<td>247</td>
<td>64.0</td>
<td>246</td>
<td>64.0</td>
<td>246</td>
</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"

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
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 disabled by default
echo never > /sys/kernel/mm/transparent_hugepage/enabled
echo never > /sys/kernel/mm/transparent_hugepage/defrag
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.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a)

(Continued on next page)
Lenovo Global Technology
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SPECspeed®2017_fp_base = 160
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Nov-2019
Software Availability: May-2019
Hardware Availability: Apr-2019

General Notes (Continued)

is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (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
Hyper-Threading set to Disable
Adjacent Cache Prefetch set to Disable
MONITOR/MWAIT set to Enable
SNC set to Enable

Sysinfo program /home/cpu2017-1.1.0-ic19.0u4/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1e864a485a0011
running on linux-9o83 Mon Nov 4 23:12:44 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)
32 "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 : 8
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): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6

(Continued on next page)
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**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Nov-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** May-2019

### Platform Notes (Continued)

- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Gold 6244 CPU @ 3.60GHz
- **Stepping:** 6
- **CPU MHz:** 3600.000
- **CPU max MHz:** 4400.0000
- **CPU min MHz:** 1200.0000
- **BogoMIPS:** 7200.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 25344K
- **NUMA node0 CPU(s):** 0-7
- **NUMA node1 CPU(s):** 8-15
- **NUMA node2 CPU(s):** 16-23
- **NUMA node3 CPU(s):** 24-31
- **Flags:** fpu vmx 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 aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault ebpx cat_l3 cdp_l3 invpcid_single intel_pmy ssbd mbd ibrs ibpb tpr_shadow vmmx flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpd rtm cmx mpx rd_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pin pti pknu ospke avx512_vnni flush_lld arch_capabilities

/proc/cpuinfo cache data  
cache size : 25344 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  
node 0 size: 386664 MB  
node 0 free: 385057 MB  
node 1 cpus: 8 9 10 11 12 13 14 15  
node 1 size: 387030 MB  
node 1 free: 386796 MB  
node 2 cpus: 16 17 18 19 20 21 22 23  
node 2 size: 387059 MB  
node 2 free: 386851 MB  
node 3 cpus: 24 25 26 27 28 29 30 31  
node 3 size: 387057 MB  
node 3 free: 386657 MB

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SPECspeed®2017_fp_base = 160
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Platform Notes (Continued)

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: 1584959960 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERS...
### Platform Notes (Continued)

From /sys/devices/virtual/dmi/id

- BIOS: Lenovo -[TEE141E-2.30]- 07/02/2019
- Vendor: Lenovo
- Product: ThinkSystem SR850 -[7X1925Z000]-
- 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)

### 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)
64, Version 19.0.4.227 Build 20190416

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Compiler Version Notes (Continued)
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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

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 byterecl
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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Tested with SPEC CPU®2017 v1.1.0 on 2019-11-04 10:12:43-0500.