## Lenovo Global Technology

ThinkSystem SR850  
(1.80 GHz, Intel Xeon Gold 6222V)  

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 175</th>
</tr>
</thead>
</table>

### 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 C/C++  
  Compiler for Linux;  
  Fortran: Version 19.0.4.227 of Intel Fortran  
  Compiler for Linux  
- **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  
- **Other:** None  
- **Power Management:** --

### Hardware

- **CPU Name:** Intel Xeon Gold 6222V  
  **Max MHz:** 3600  
  **Nominal:** 1800  
  **Enabled:** 80 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:** 27.5 MB I+D on chip per chip  
  **Other:** None  
- **Memory:** 768 GB (48 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)  
- **Storage:** 1 x 800 GB SATA SSD  
- **Other:** None

### Benchmark Results

<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>80</td>
<td>175</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>80</td>
<td>152</td>
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<tr>
<td>619.lbm_s</td>
<td>80</td>
<td>119</td>
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<tr>
<td>621.wrf_s</td>
<td>80</td>
<td>126</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>80</td>
<td>55.9</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>80</td>
<td>168</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>80</td>
<td>304</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>80</td>
<td>112</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
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<td>285</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>
Lenovo Global Technology
ThinkSystem SR850
(1.80 GHz, Intel Xeon Gold 6222V)

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

SPECspeed®2017_fp_base = 175
SPECspeed®2017_fp_peak = Not Run

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>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>80</td>
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<td>751</td>
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<td>607.cactuBSSN_s</td>
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<td>169</td>
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<td>619.lbm_s</td>
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<td>34.5</td>
<td>152</td>
<td>34.6</td>
<td>151</td>
<td>34.6</td>
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<tr>
<td>621.wrf_s</td>
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<td>120</td>
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<tr>
<td>627.cam4_s</td>
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<tr>
<td>628.pop2_s</td>
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<td>55.9</td>
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<td>638.imagick_s</td>
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<td>644.nab_s</td>
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<td>81.2</td>
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<td>654.roms_s</td>
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<td>55.3</td>
<td>285</td>
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<td>284</td>
<td>55.3</td>
<td>285</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u4/lib/intel64"
OMP_STACKSIZE = "192M"

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) 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.
Lenovo Global Technology
ThinkSystem SR850
(1.80 GHz, Intel Xeon Gold 6222V)

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Sep-2019
Tested by: Lenovo Global Technology
Software Availability: May-2019

**Platform Notes**

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
Hyper-Threading set to Disable
Adjacent Cache Prefetch set to Disable
MONITOR/MWAIT set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-hxhl Thu Sep 19 17:47:20 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 6222V CPU @ 1.80GHz
    4 "physical id"s (chips)
    80 "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 : 20
    siblings : 20
    physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
    physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
    physical 2: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
    physical 3: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
    Architecture: x86_64
    CPU op-mode(s): 32-bit, 64-bit
    Byte Order: Little Endian
    CPU(s): 80
    On-line CPU(s) list: 0-79
    Thread(s) per core: 1
    Core(s) per socket: 20
    Socket(s): 4
    NUMA node(s): 4
    Vendor ID: GenuineIntel
    CPU family: 6
    Model: 85
    Model name: Intel(R) Xeon(R) Gold 6222V CPU @ 1.80GHz
    Stepping: 7
    CPU MHz: 1800.000
    CPU max MHz: 3600.0000
    CPU min MHz: 800.0000
    BogoMIPS: 3600.00
    Virtualization: VT-x

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

**Lenovo Global Technology**

**ThinkSystem SR850**

(1.80 GHz, Intel Xeon Gold 6222V)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>175</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

**Test Date:** Sep-2019  
**Hardware Availability:** Jul-2019  
**Software Availability:** May-2019

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**Platform Notes (Continued)**

- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 28160K
- **NUMA node0 CPU(s):** 0-19
- **NUMA node1 CPU(s):** 20-39
- **NUMA node2 CPU(s):** 40-59
- **NUMA node3 CPU(s):** 60-79
- **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 noclone腕 topology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_ppnv ssbd mba ibrs ibp b tid_tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ireds invpcid rtm cqm mpx rdtsa_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pin pts pku ospke avx512_vnni flush_l1d arch_capabilities

/proc/cpuinfo cache data

```
  cache size : 28160 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 16 17 18 19
  node 0 size: 193129 MB
  node 0 free: 192686 MB
  node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
  node 1 size: 193492 MB
  node 1 free: 193301 MB
  node 2 cpus: 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59
  node 2 size: 193521 MB
  node 2 free: 191917 MB
  node 3 cpus: 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  node 3 size: 193519 MB
  node 3 free: 193291 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: 792231360 kB
```

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

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**Platform Notes (Continued)**

- **HugePages_Total:** 0
- **Hugepagesize:** 2048 kB

From `/etc/*release` /`/etc/*version`:

**SuSE-release:**
- SUSE Linux Enterprise Server 12 (x86_64)
- VERSION = 12
- PATCHLEVEL = 4

# This file is deprecated and will be removed in a future service pack or release.
# Please check `/etc/os-release` for details about this release.

**os-release:**
- NAME="SLES"
- VERSION="12-SP4"
- VERSION_ID="12.4"
- PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
- ID="sles"
- ANSI_COLOR="0;32"
- CPE_NAME="cpe:/o:suse:sles:12:sp4"

**uname -a:**


x86_64 x86_64 x86_64 GNU/Linux

**Kernel self-reported vulnerability status:**

- CVE-2017-5754 (Meltdown): Not affected
- CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

**run-level 3** Sep 19 16:51

**SPEC is set to:** /home/cpu2017-1.0.5-ic19.0u4

<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>btrfs</td>
<td>744G</td>
<td>40G</td>
<td>704G</td>
<td>6%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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.

**BIOS Lenovo -[TEE141E-2.30]- 07/02/2019**

**Memory:**
- 48x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2400

**(End of data from sysinfo program)**
Lenovo Global Technology
ThinkSystem SR850
(1.80 GHz, Intel Xeon Gold 6222V)

SPECspeed®2017_fp_base = 175
SPECspeed®2017_fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Sep-2019
Tested by: Lenovo Global Technology
Hardware Availability: Jul-2019
Software Availability: May-2019

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
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

(Continued on next page)
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SPECspeed®2017_fp_base = 175
SPECspeed®2017_fp_peak = Not Run

Base Compiler Invocation (Continued)

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

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

(Continued on next page)
## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- `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](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](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-F.xml)