## Lenovo Global Technology

**ThinkSystem SR850**
(2.30 GHz, Intel Xeon Gold 6252N)

<table>
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<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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</tr>
<tr>
<td>638.imagick_s</td>
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<td>644.nab_s</td>
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<td>649.fotonik3d_s</td>
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<tr>
<td>654.roms_s</td>
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</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;

**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:** --

---

**Hardware**

**CPU Name:** Intel Xeon Gold 6252N

**Max MHz:** 3600

**Nominal:** 2300

**Enabled:** 96 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:** 35.75 MB I+D on chip per chip

**Other:** None

**Memory:** 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)

**Storage:** 1 x 800 GB SATA SSD

**Other:** None

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**Test Date:** Sep-2019

**Hardware Availability:** Jul-2019

**Software Availability:** May-2019

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Lenovo Global Technology
ThinkSystem SR850
(2.30 GHz, Intel Xeon Gold 6252N)

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

Results Table

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</table>

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.
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-9o83 Wed Sep 25 03:21:41 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 6252N CPU @ 2.30GHz
  - 4 "physical id"s (chips)
  - 96 "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 : 24
  - siblings : 24
  - physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
  - physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
  - physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
  - physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 96
- On-line CPU(s) list: 0-95
- Thread(s) per core: 1
- Core(s) per socket: 24
- Socket(s): 4
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6252N CPU @ 2.30GHz
- Stepping: 7
- CPU MHz: 2300.000
- CPU max MHz: 3600.0000
- CPU min MHz: 1000.0000
- BogoMIPS: 4600.00
- Virtualization: VT-x

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR850
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**SPECspeed®2017_fp_base = 213**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_peak = Not Run</th>
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

**Platform Notes (Continued)**

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<thead>
<tr>
<th>L1d cache:</th>
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<td>L1i cache:</td>
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<tr>
<td>L2 cache:</td>
<td>1024K</td>
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<tr>
<td>L3 cache:</td>
<td>36608K</td>
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<tr>
<td>NUMA node0 CPU(s):</td>
<td>0–23</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>24–47</td>
</tr>
<tr>
<td>NUMA node2 CPU(s):</td>
<td>48–71</td>
</tr>
<tr>
<td>NUMA node3 CPU(s):</td>
<td>72–95</td>
</tr>
</tbody>
</table>

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 ntopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrang pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3
invcpcid_single intel_ppln ssbd mba ibrs ibp bts ibpb 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 xsaves opt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pin pts pku ospke avx512_vnni flush_lld arch_capabilities

/proc/cpuinfo cache data
cache size: 36608 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 20 21 22 23
node 0 size: 386661 MB
node 0 free: 384966 MB
node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
node 1 size: 387028 MB
node 1 free: 386646 MB
node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
node 2 size: 387056 MB
node 2 free: 386866 MB
node 3 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
node 3 size: 387054 MB
node 3 free: 386862 MB
node distances:
node 0 1 2 3
 0: 10 21 21 31
 1: 21 31 10 21
 2: 21 31 10 21
 3: 31 21 21 10

From /proc/meminfo
MemTotal: 1584947872 kB

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR850
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<table>
<thead>
<tr>
<th>CPU2017 License: 9017</th>
<th>Test Date: Sep-2019</th>
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<tbody>
<tr>
<td>Test Sponsor: Lenovo Global Technology</td>
<td>Hardware Availability: Jul-2019</td>
</tr>
<tr>
<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: May-2019</td>
</tr>
</tbody>
</table>

**SPECsspeed®2017_fp_base = 213**

**SPECsspeed®2017_fp_peak = Not Run**

**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 25 02:32**

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

- **Filesystem**
  - **Type**
  - **Size**
  - **Used**
  - **Avail**
  - **Use%**
  - **Mounted on**
  - `dev/sda2`  btrfs  744G  135G  609G  19% /home

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 SMI BIOS" standard.

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

**Memory:**
- `48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933`

(End of data from `sysinfo` program)
Lenovo Global Technology
ThinkSystem SR850
(2.30 GHz, Intel Xeon Gold 6252N)

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</table>

**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)
-----------------------------------------------------------------------------
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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)
**Lenovo Global Technology**  
ThinkSystem SR850  
(2.30 GHz, Intel Xeon Gold 6252N)

| SPECspeed®2017_fp_base | 213 |
| 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`
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<td>Lenovo Global Technology</td>
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**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)

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

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Tested with SPEC CPU®2017 v1.0.5 on 2019-09-24 15:21:40-0400.  