## Lenovo Global Technology

### Test Date: Apr-2018

### Hardware

- **CPU Name:** Intel Xeon Gold 6140M
- **Max MHz.:** 3700
- **Nominal:** 2300
- **Enabled:** 72 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:** 24.75 MB I+D on chip per core
- **Memory:** 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)
- **Storage:** 1 x 800 GB SAS SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP2 (x86_64)
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++
- **Compiler for Linux:** Fortran: Version 18.0.0.128 of Intel Fortran
- **Compiler for Linux:** None
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version TEE119R 1.22 released Feb-2018
- **Field System:** btrfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None

### Lenovo Global Technology

**ThinkSystem SR850**

(2.30 GHz, Intel Xeon Gold 6140M)

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Hardware Availability:** Aug-2017

**Software Availability:** Feb-2018

### SPECspeed2017_fp_base = 143

### SPECspeed2017_fp_peak = 144

### Threads

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<td>628.pop2_s</td>
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<td>638.imagick_s</td>
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<tr>
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<td>649.fotonik3d_s</td>
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### SPECspeed2017_fp_base (143)

### SPECspeed2017_fp_peak (144)
Lenovo Global Technology
ThinkSystem SR850
(2.30 GHz, Intel Xeon Gold 6140M)

SPECspeed2017_fp_base = 143
SPECspeed2017_fp_peak = 144

**Results Table**

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<td>121</td>
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<td>114</td>
<td>138</td>
<td></td>
<td></td>
</tr>
</tbody>
</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:
LD_LIBRARY_PATH "/home/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/je5.0.1-64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
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
Yes: 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.

**Platform Notes**

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
Lenovo Global Technology
ThinkSystem SR850
(2.30 GHz, Intel Xeon Gold 6140M)

SPECspeed2017_fp_base = 143
SPECspeed2017_fp_peak = 144

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

Platform Notes (Continued)

DCU Streamer Prefetcher set to Disable
MONITORMWAIT set to Enable
Trusted Execution Technology set to Enable
DCA set to Enable
Stale AtoS set to Enable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-nx6k Tue Apr 3 15:38:11 2018

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 6140M CPU @ 2.30GHz
  4 "physical id"s (chips)
  72 "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 : 18
siblings : 18
  physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 1
Core(s) per socket: 18
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6140M CPU @ 2.30GHz
Stepping: 4
CPU MHz: 2294.607
BogoMIPS: 4589.21
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR850
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SPECspeed2017_fp_base = 143
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CPU2017 License: 9017
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Test Date: Apr-2018
Hardware Availability: Aug-2017
Software Availability: Feb-2018

Platform Notes (Continued)

L3 cache: 25344K
NUMA node0 CPU(s): 0-17
NUMA node1 CPU(s): 18-35
NUMA node2 CPU(s): 36-53
NUMA node3 CPU(s): 54-71
Flags: fpu vme de pse tsc msr pae mca cmov 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 ntopology nonstop_tsc aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xsave pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb invpcid_single pln pts dtherm intel_pt rsb_ctxtsw spec_ctrl retpoline kaiser tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmon hle avx2 smep bmi2 erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc /proc/cpuinfo cache data

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
node 0 size: 386658 MB
node 0 free: 386019 MB
node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
node 1 size: 387057 MB
node 1 free: 384942 MB
node 2 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
node 2 size: 387057 MB
node 2 free: 386687 MB
node 3 cpus: 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
node 3 size: 387054 MB
node 3 free: 386257 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: 1584975168 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

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

**ThinkSystem SR850**
(2.30 GHz, Intel Xeon Gold 6140M)

<table>
<thead>
<tr>
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<tr>
<td>SPECspeed2017_fp_peak</td>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Apr-2018  
**Hardware Availability:** Aug-2017  
**Software Availability:** Feb-2018

---

**Platform Notes (Continued)**

SuSE-release:
- SUSE Linux Enterprise Server 12 (x86_64)
- VERSION = 12
- PATCHLEVEL = 2

# 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-SP2"
- VERSION_ID="12.2"
- PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
- ID="sles"
- ANSI_COLOR="0;32"
- CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
```
Linux linux-nx6k 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018 (c6ce5db)
x86_64 x86_64 x86_64 GNU/Linux
```

run-level 3 Apr 3 10:31

SPEC is set to: /home/cpu2017.1.0.2.ic18.0

**Filesystem**  **Type**  **Size**  **Used**  **Avail**  **Use%**  **Mounted on**
---
/dev/sda2  btrfs  744G  281G  462G  38%  /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 SMBIOS" standard.

- BIOS Lenovo -[TEE119R-1.22]- 02/06/2018
- Memory:
  - 48x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo program)

---

### Compiler Version Notes

```
CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
----------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
----------------------------------------------
CC  619.lbm_s(peak)
```

(Continued on next page)
Compiler Version Notes (Continued)

-----------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
-----------------------------------------------------------------------------------
FC 607.cactuBSSN_s(base)
-----------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
-----------------------------------------------------------------------------------
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(Continued on next page)
**Lenovo Global Technology**

ThinkSystem SR850  
(2.30 GHz, Intel Xeon Gold 6140M)

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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Test Date:** Apr-2018  
**Hardware Availability:** Aug-2017  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Feb-2018

---

**Compiler Version Notes (Continued)**

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

---

```plaintext
CC   621.wrf_s(peak) 628.pop2_s(peak)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

---

**Base Compiler Invocation**

C benchmarks:

- `icc`

Fortran benchmarks:

- `ifort`

Benchmarks using both Fortran and C:

- `ifort icc`

Benchmarks using Fortran, C, and C++:

- `icpc icc ifort`

---

**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`
Lenovo Global Technology
ThinkSystem SR850
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**SPEC CPU2017 Floating Point Speed Result**

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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=3  -qopenmp  -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP  -xCORE-AVX512  -ipo  -O3  -no-prec-div  -qopt-prefetch  
-ffinite-math-only  -qopt-mem-layout-trans=3  -qopenmp  
-nostandard-realloc-lhs  -align array32byte

Benignments using both Fortran and C:
-xCORE-AVX512  -ipo  -O3  -no-prec-div  -qopt-prefetch  
-ffinite-math-only  -qopt-mem-layout-trans=3  -qopenmp  -DSPEC_OPENMP  
-nostandard-realloc-lhs  -align array32byte

Benignments using Fortran, C, and C++:
-xCORE-AVX512  -ipo  -O3  -no-prec-div  -qopt-prefetch  
-ffinite-math-only  -qopt-mem-layout-trans=3  -qopenmp  -DSPEC_OPENMP  
-nostandard-realloc-lhs  -align array32byte

---

**Base Other Flags**

C benchmarks:
-m64  -std=c11

Fortran benchmarks:
-m64

Benignments using both Fortran and C:
-m64  -std=c11

Benignments using Fortran, C, and C++:
-m64  -std=c11

---

**Peak Compiler Invocation**

C benchmarks:
icc

Fortran benchmarks:
ifort

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR850
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SPECspeed2017_fp_base = 143
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Apr-2018
Hardware Availability: Aug-2017
Software Availability: Feb-2018

Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP

638.imagick_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP

644.nab_s: Same as 638.imagick_s

Fortran benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR850
(2.30 GHz, Intel Xeon Gold 6140M)

SPECspeed2017_fp_peak = 144
SPECspeed2017_fp_base = 143

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

Test Date: Apr-2018
Hardware Availability: Aug-2017
Software Availability: Feb-2018

Peak Optimization Flags (Continued)

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
- prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512 -qopt-prefetch
- ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
- DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
- align array32byte

Peak Other Flags

C benchmarks:
- m64 -std=c11

Fortran benchmarks:
- m64

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

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-C.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-C.xml

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