**SPEC CPU®2017 Floating Point Speed Result**

Lenovo Global Technology  
ThinkSystem SR950  
(2.10 GHz, Intel Xeon Gold 6238L)

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
</table>
| OS: SUSE Linux Enterprise Server 15 (x86_64)  
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  
Intel: Yes  
File System: btrfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: Not Applicable  
Other: None  
Power Management: -- | CPU Name: Intel Xeon Gold 6238L  
Max MHz: 3700  
Nominal: 2100  
Enabled: 88 cores, 4 chips  
Orderable: 2,3,4 chips  
Cache L1: 32 KB I + 32 KB D on chip per core  
L2: 1 MB I+D on chip per core  
L3: 30.25 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 |

**SPECspeed®2017_fp_base = 204**  
**SPECspeed®2017_fp_peak = Not Run**

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

### Threads

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base (204)</th>
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<tbody>
<tr>
<td>603.bwaves_s 88</td>
</tr>
<tr>
<td>607.cactuBSSN_s 88</td>
</tr>
<tr>
<td>619.lbm_s 88</td>
</tr>
<tr>
<td>621.wrf_s 88</td>
</tr>
<tr>
<td>627.cam4_s 88</td>
</tr>
<tr>
<td>628.pop2_s 88</td>
</tr>
<tr>
<td>638.imagick_s 88</td>
</tr>
<tr>
<td>644.nab_s 88</td>
</tr>
<tr>
<td>649.fotonik3d_s 88</td>
</tr>
<tr>
<td>654.roms_s 88</td>
</tr>
</tbody>
</table>

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<tbody>
<tr>
<td>SPECspeed®2017_fp_peak =</td>
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**CPU2017 License:**
9017

**Test Date:**
Aug-2019

**Test Sponsor:**
Lenovo Global Technology

**Hardware Availability:**
Jul-2019

**Tested by:**
Lenovo Global Technology

**Software Availability:**
May-2019

## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
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<tr>
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<td>649.fotonik3d_s</td>
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<td>79.2</td>
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</tr>
</tbody>
</table>

**SPECspeed®2017_fp_base =** 204

**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"

## 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 SR950
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SPECSpeed®2017_fp_base = 204
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Test Date: Aug-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
CPU P-state Control set to Cooperative
Hyper-Threading set to Disable
Adjacent Cache Prefetch set to Disable
MONITOR/MWAIT set to Enable
Stale AtoS set to Enable

SYSsinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-i7o2 Tue Aug 20 19:46:45 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 6238L CPU @ 2.10GHz
  4 "physical id"s (chips)
  88 "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 : 22
siblings : 22
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 88
On-line CPU(s) list: 0-87
Thread(s) per core: 1
Core(s) per socket: 22
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6238L CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2100.000
CPU max MHz: 3700.0000

(Continued on next page)
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SPECspeed®2017_fp_base = 204
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Platform Notes (Continued)

CPU min MHz: 1000.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 3076K
NUMA node0 CPU(s): 0-21
NUMA node1 CPU(s): 22-43
NUMA node2 CPU(s): 44-65
NUMA node3 CPU(s): 66-87

Flags: fpu vme de pse tsc msr pae mce 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 cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault ebт cat_13 cdп_13 invpcid_single ssbd mba ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtм cmq mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv1 xsaves cmq_llc cmq_occum_llc cmq_mbb_total cmq_mbb_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni flush_lld arch_capabilities

/proc/cpuinfo cache data
 cache size : 30976 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
 node 0 size: 386610 MB
 node 0 free: 382994 MB
 node 1 cpus: 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
 node 1 size: 387051 MB
 node 1 free: 386469 MB
 node 2 cpus: 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65
 node 2 size: 387051 MB
 node 2 free: 386756 MB
 node 3 cpus: 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87
 node 3 size: 387048 MB
 node 3 free: 386789 MB
 node distances:
 node 0 1 2 3
 0: 10 21 21 21
 1: 21 10 21 21
 2: 21 21 10 21

(Continued on next page)
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**CPU2017 License:** 9017  
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**Tested by:** Lenovo Global Technology  

---  

### Platform Notes (Continued)

```
3: 21 21 21 10
```

From `/proc/meminfo`

```
MemTotal:       1584907636 kB  
HugePages_Total:       0  
Hugepagesize:       2048 kB
```

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

```
os-release:  
    NAME=“SLES”  
    VERSION=“15”  
    VERSION_ID=“15”  
    PRETTY_NAME=“SUSE Linux Enterprise Server 15”  
    ID=“sles”  
    ID_LIKE=“suse”  
    ANSI_COLOR=“0;32”  
    CPE_NAME=“cpe:/o:suse:sles:15”
```

```
uname -a:  
    Linux linux-i7o2 4.12.14-25.13-default #1 SMP Tue Aug 14 15:07:35 UTC 2018 (947aa51)  
        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 Aug 20 19:39
```

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

```
Filesystem     Type     Size  Used Avail Use% Mounted on  
/dev/sda2      btrfs    742G  57G  685G   8%  /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 -[PSE121R-1.53]- 07/03/2019  
- Memory:  
  - 48x NO DIMM NO DIMM  
  - 48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
## Lenovo Global Technology

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<td>Lenovo Global Technology</td>
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### SPECspeed®2017_fp_base = 204

### SPECspeed®2017_fp_peak = Not Run

### Compiler Version Notes

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<th>Base Compiler Invocation</th>
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<td>C</td>
<td>-----langbase-----619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)</td>
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</tbody>
</table>
|          | 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 | -----langbase-----607.cactubsns(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 | -----langbase-----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 | -----langbase-----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. |

### Base Compiler Invocation

C benchmarks:  
*icc* -m64 -std=c11

(Continued on next page)
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### 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 -gopt-prefetch
-ffinite-math-only -gopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

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

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

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

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