Lenovo Global Technology
ThinkSystem SN550
(2.10 GHz, Intel Xeon Silver 4216)

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

**SPECspeed2017_fp_base = 113**
**SPECspeed2017_fp_peak = Not Run**

**Test Date:** Apr-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Nov-2018

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base (113)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Silver 4216
- **Max MHz.:** 3200
- **Nominal:** 2100
- **Enabled:** 32 cores, 2 chips, 2 threads/core
- **Orderable:** 1,2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 22 MB I+D on chip per chip
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

**Software**

- **OS:** Red Hat Enterprise Linux Server release 7.6 (Maipo)
- **Compiler:** C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux;
  Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version IVE135M 2.10 released Jan-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None
### SPEC CPU2017 Floating Point Speed Result

**Test Sponsor:** Lenovo Global Technology  
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#### Lenovo ThinkSystem SN550  
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**Results Table**

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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>x 437</td>
<td>x 436</td>
<td>x 435</td>
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<td>607.cactuBSSN_s</td>
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<td>x 123</td>
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<td>619.lbm_s</td>
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<td>x 107</td>
<td>x 107</td>
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<td>627.cam4_s</td>
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<td>x 71.4</td>
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<td>x 71.0</td>
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<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
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<td>x 63.5</td>
<td>x 63.5</td>
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<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>x 90.4</td>
<td>x 90.4</td>
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<td>x 162</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>x 74.3</td>
<td>x 74.4</td>
<td>x 72.7</td>
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<td></td>
<td></td>
</tr>
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</table>

**SPECspeed2017_fp_base** = 113  
**SPECspeed2017_fp_peak** = Not Run

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**General Notes**

- Environment variables set by runcpu before the start of the run:
  - KMP_AFFINITY = "granularity=fine,compact,1,0"
  - LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"

- Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM

---

**Operating System Notes**

- Stack size set to unlimited using "ulimit -s unlimited"

---

**Results**

- Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

---

**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.

**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.
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| SPECspeed2017_fp_base = | 113 |
| SPECspeed2017_fp_peak = | Not Run |

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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---

**Platform Notes**

BIOS configuration:
Choose Operating Mode set to Custom Mode
Page Policy set to Adaptive
Trusted Execution Technology set to Enable
Sysinfo program `/home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo`
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on localhost.localdomain Thu Apr 25 06:51:55 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) Silver 4216 CPU @ 2.10GHz
  2 "physical id"s (chips)
  64 "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 : 16
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

From `lscpu`:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4216 CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2100.000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 22528K
NUMA node0 CPU(s): 0-15,32-47
NUMA node1 CPU(s): 16-31,48-63
```

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

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Platform Notes (Continued)

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 rdtsscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmpref eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtrf pdcm pcd dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 intel_pt ssbd mba
ibrs ibpb stibp ibrs_enhanced tpr_shadow vnni flexpriority ept vpid fsgsbase
tsc_adjust bm1 hle avx2 smep bmi2 erms invpcid rdt_a avx512f avx512dq
rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsave cpq
cmo llc cmq_occu llc cmq_mbm_total cmq_mbm_local dtherm ida arat pln pts hwp_epp
pku ospke avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size: 22528 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 32 33 34 35 36 37 38 39 40 41 42 43
           44 45 46 47
  node 0 size: 392889 MB
  node 0 free: 383443 MB
  node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56
           57 58 59 60 61 62 63
  node 1 size: 393216 MB
  node 1 free: 384290 MB
  node distances:
  node 0  1
  0:  10  21
  1:  21  10

From /proc/meminfo
  MemTotal:       792241468 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux Server"
    VERSION="7.6 (Maipo)"
    ID="rhel"
    ID_LIKE="fedora"
    VARIANT="Server"
    VARIANT_ID="server"
    VERSION_ID="7.6"
    PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
  redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)

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# Lenovo Global Technology

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**Platform Notes (Continued)**

```
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)

uname -a:
    Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
    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: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS

run-level 3 Apr 25 06:50

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/sda2 xfs 839G 21G 819G 3% /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 -[IVE135M-2.10]- 01/16/2019
Memory:
    24x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666, configured at 2400
```

---

**Compiler Version Notes**

```
==============================================================================
CC  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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
FC  607.cactuBSSN_s(base)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
    Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
```

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

Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

```
FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
```

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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
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```
CC  621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
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64, Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 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
```

(Continued on next page)
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Base Portability Flags (Continued)

607.cactuBSSN_s: -DSPEC_LP64
619.libm_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
-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-A.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-A.xml
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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2019-04-25 06:51:55-0400.  