### Lenovo Global Technology

**ThinkSystem SN550**  
(2.20 GHz, Intel Xeon Platinum 8276L)

---

<table>
<thead>
<tr>
<th>Threads</th>
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<th>SPECspeed\textsuperscript{\textregistered}2017_fp_peak</th>
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<tr>
<td>607.cactuBSSN_s 56</td>
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<td>619.lbm_s 56</td>
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<td>621.wrf_s 56</td>
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<tr>
<td>627.cam4_s 56</td>
<td>61.2</td>
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<td>638.imagick_s 56</td>
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<tr>
<td>644.nab_s 56</td>
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<tr>
<td>649.fotonik3d_s 56</td>
<td>162</td>
<td></td>
</tr>
<tr>
<td>654.roms_s 56</td>
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</tr>
</tbody>
</table>

---

**Hardware**

**CPU**
- Name: Intel Xeon Platinum 8276L  
- Max MHz: 4000  
- Nominal: 2200  
- Enabled: 56 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: 38.5 MB I+D on chip per chip  
- Other: None  
- Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)  
- Storage: 1 x 960 GB SATA SSD  
- Other: None

**Software**

**OS:**  
Red Hat Enterprise Linux Server release 7.6 (Maipo)  
Kernel 3.10.0-957.el7.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

**Parallel:**  
Yes

**Firmware:**  
Lenovo BIOS Version IVE142E 2.30 released Aug-2019 tested as IVE141E 2.30 Jul-2019

**File System:**  
xfs

**System State:**  
Run level 3 (multi-user)

**Base Pointers:**  
64-bit

**Peak Pointers:**  
Not Applicable

**Other:**  
None

**Power Management:**  
--
### Lenovo Global Technology

ThinkSystem SN550

(2.20 GHz, Intel Xeon Platinum 8276L)

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

---

### Results Table

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<tr>
<th>Benchmark</th>
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</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:

- **KMP_AFFINITY** = "granularity=fine,compact,1,0"
- **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 enabled by default  
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 SN550
(2.20 GHz, Intel Xeon Platinum 8276L)

**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-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9b65e8f2999c33d61f64985e45859ea9
running on localhost.localdomain Tue Sep 17 06:19:41 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) Platinum 8276L CPU @ 2.20GHz
  2 "physical id"s (chips)
  112 "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 : 28
siblings : 56
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                112
On-line CPU(s) list:   0-111
Thread(s) per core:    2
Core(s) per socket:    28
Socket(s):             2
NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Platinum 8276L CPU @ 2.20GHz
Stepping:              6
CPU MHz:               2200.000
BogoMIPS:              4400.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              39424K
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Platinum 8276L)

SPECspeed®2017_fp_base = 149
SPECspeed®2017_fp_peak = Not Run

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

Platform Notes (Continued)

NUMA node0 CPU(s): 0-27,56-83
NUMA node1 CPU(s): 28-55,84-111
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 nopl nonstop_tsc
  aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
  fma cx16 xptr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
  xsave avx f16c rdrand lahf_lm abm 3nowprefetch ebcd13 cd pcd_t3 intel_pinn
  intel_pt ssbd mba ibrs ibpb stibp ibrs enhanced tpr_shadow vnmis flexpriority ept
  vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmq mp boolean rdto a
  vsx512f avx512dq rsrseed adx smap clflushopt clwb axx512cd axx512bw axx512vl xsaveopt
  xsavexc xgetbv1 cmq_lll cmq_occum llc cmq_mbm_total cmq_mbm_local dtherm ida arat pln
  pts hw_epp pku ospke axx512_vmmi spec_ctrl intel_stibp flush_lld arch_capabilities

From /proc/cpuinfo cache data
  cache size : 39424 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 16 17 18 19 20 21 22 23 24 25 26 27
  56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83
  node 0 size: 392888 MB
  node 0 free: 383104 MB
  node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
  53 54 55 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106
  107 108 109 110 111
  node 1 size: 393216 MB
  node 1 free: 384083 MB
  node distances:
  node 0 1
  0: 10 21
  1: 21 10

From /proc/meminfo
  MemTotal: 792239704 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"

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550
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SPECspeed®2017_fp_base = 149
SPECspeed®2017_fp_peak = Not Run

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

**Platform Notes (Continued)**

```
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)
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 Sep 17 06:18

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

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 839G 26G 814G 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 -[IVE141E-2.30]- 07/02/2019
Memory:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933
```

(End of data from sysinfo program)

**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,
```

(Continued on next page)
## Lenovo Global Technology

**ThinkSystem SN550**  
*(2.20 GHz, Intel Xeon Platinum 8276L)*

<table>
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<tr>
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### Compiler Version Notes (Continued)

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

<table>
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<tr>
<th>C benchmarks:</th>
<th>icc -m64 -std=c11</th>
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<th>Fortran benchmarks:</th>
<th>ifort -m64</th>
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<th>Benchmarks using both Fortran and C:</th>
<th>ifort -m64 icc -m64 -std=c11</th>
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<tr>
<th>Benchmarks using Fortran, C, and C++:</th>
<th>icpc -m64 icc -m64 -std=c11 ifort -m64</th>
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Lenovo Global Technology
ThinkSystem SN550
(2.20 GHz, Intel Xeon Platinum 8276L)

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

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

### Base Portability Flags

- 603.bwaves_s: -DSPEC_LP64
- 607.cactuBSSN_s: -DSPEC_LP64
- 619.llm_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-D.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-D.xml
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**SPEC CPU®2017 Floating Point Speed Result**

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

---

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Tested with SPEC CPU®2017 v1.0.5 on 2019-09-16 18:19:40-0400.
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