Lenovo Global Technology

ThinkSystem SN550
(2.20 GHz, Intel Xeon Platinum 8276)

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

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base =</th>
<th>SPECspeed2017_fp_peak =</th>
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<tr>
<td>603.bwaves_s</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<tr>
<td>619.lbm_s</td>
<td>56</td>
<td></td>
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<tr>
<td>621.wrf_s</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>56</td>
<td></td>
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<tr>
<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>56</td>
<td></td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Platinum 8276
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: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)
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
### Lenovo Global Technology
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**Test Date:** May-2019  
**Hardware Availability:** Apr-2019  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Nov-2018

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<tr>
<th>Benchmark</th>
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<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>106</td>
<td>148</td>
<td>106</td>
<td>149</td>
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</tbody>
</table>

**SPECspeed2017_fp_base =** 142  
**SPECspeed2017_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,1,0"  
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"  
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-7900X 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

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

### 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 Fri May 24 09:40:24 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 8276 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 8276 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)
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SPECspeed2017_fp_base = 142
SPECspeed2017_fp_peak = Not Run

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 ntopology nonstop_tsc
    aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
    fma cx16 xtpr pdcz pdcm pccid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
    xsave avx f16c rdrand lahf_lm abm 3nowprefetch epb cat_l3 cdp_l3 intel_pt ssbd mba
    ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase
    tsc_adjust bmi1 hle avx2 smep bmi2 erna invpcid rtm cqm mpx rd_t_a avx512f avx512dq
    rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1
    cqm_llc cqm_occach_11c cqm_mmm_total cqm_mmm_local dtherm ida arat pln pts hwp_epp
    pku ospke avx512_vnni spec_ctrl intel_stibp flush_l1d 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: 196280 MB
    node 0 free: 190629 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: 196608 MB
    node 1 free: 191854 MB
    node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
    MemTotal: 395878676 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)
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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 May 24 09:37

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda2      xfs   839G   14G  826G   2% /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 M393A2K43BB1-CTD 16 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>CC   619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)</th>
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<tbody>
<tr>
<td>Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,</td>
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<tr>
<td>Version 19.0.1.144 Build 20181018</td>
</tr>
<tr>
<td>Copyright (C) 1985-2018 Intel Corporation. All rights reserved.</td>
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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.

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FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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------------------------------------------------------------------------------

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
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Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.hm3_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 2019-05-23 21:40:24-0400.
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