Lenovo Global Technology
ThinkSystem SN550
(2.70 GHz, Intel Xeon Gold 5220S)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>36</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>36</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>36</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>36</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>36</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>36</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>36</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>36</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>36</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>36</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 5220S  
- **Max MHz:** 3900  
- **Nominal:** 2700  
- **Enabled:** 36 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:** 24.75 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

**Software**

- **OS:** Red Hat Enterprise Linux Server release 7.6 (Maipo)  
- **Compiler:** C/C++: Version 19.0.4.227 of Intel  
- **Compiler for Linux:** Compiler for Linux  
- **Kernel:** 3.10.0-957.el7.x86_64  
- **Fortran:** Version 19.0.4.227 of Intel Fortran  
- **Compiler for Linux:** Yes  
- **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

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SPEC®2017 Floating Point Speed Result

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<td>139</td>
<td>113</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 120
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,1,0"
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-icl19.0u4/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
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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-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on localhost.localdomain Tue Sep 17 00:16:41 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) Gold 5220S CPU @ 2.70GHz
  2 "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 : 36
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

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: 2
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5220S CPU @ 2.70GHz
Stepping: 7
CPU MHz: 2700.000
BogoMIPS: 5400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-17,36-53
NUMA node1 CPU(s): 18-35,54-71

(Continued on next page)
Lenovo Global Technology  
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SPECspeed®2017_fp_base = 120  
SPECspeed®2017_fp_peak = Not Run  

**Platform Notes (Continued)**

Flags:  
- fpu  
- vme  
- de  
- pse  
- tsc  
- msr  
- mce  
- cx8  
- apic  
- sep  
- mtrr  
- pae  
- 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  
- nop1  
- xtopology  
- nonstop_tsc  
- aperfmperf  
- eagerfpu  
- pni  
- pclmulqdq  
- dtes64  
- monitor  
- ds_cpl  
- vmx  
- smx  
- est  
- tm2  
- ssse3  
- sdbg  
- fma  
- cx16  
- xtrr  
- pdcm  
- pcd  
- dca  
- sse4_1  
- sse4_2  
- x2apic  
- movbe  
- popcnt  
- tsc_deadline_timer  
- aes  
- xsave  
- avx  
- f16c  
- rdrand  
- lahf_lm  
- abm  
- 3nowprefetch  
- epb  
- cat_13  
- cdp_13  
- intel_ppin  
- intel_pt  
- sbbd  
- mba  
- ibrs  
- ibpb  
- stibp  
- ibrs_enhanced  
- tpr_shadow  
- vmmi  
- flexpriority  
- ept  
- vpid  
- fsbgbase  
- tsc_adjust  
- bmi1  
- hle  
- avx2  
- smep  
- bmi2  
- erms  
- invpcid  
- rtm  
- cp  
- mp  
- rdt_a  
- avx512f  
- avx512dq  
- rdseed  
- adx  
- smap  
- clflushopt  
- clwb  
- avx512cd  
- avx512bw  
- avx512vl  
- xsaveopt  
- xsavec  
- xgetbv1  
- cqm_llc  
- cqm_occup_llc  
- cqm_mbm_total  
- cqm_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 : 25344 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 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53  
node 0 size: 196280 MB  
node 0 free: 190967 MB  
node 1 cpus: 18 19 20 21 22 23 24 25 26 27 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  
node 1 size: 196608 MB  
node 1 free: 191910 MB  
node distances:  
- node 0 1  
  0:  10  21  
  1:  21  10  

From /proc/meminfo  
MemTotal:       395878432 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)  

(Continued on next page)
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CPU2017 License: 9017
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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 Sep 17 00:14

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      xfs   839G   33G  807G   4% /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 M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2666

(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,
    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,

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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) 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)
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
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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

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.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 -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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.0.5 on 2019-09-17 00:16:41-0400.
Originally published on 2019-10-01.