Lenovo Global Technology

ThinkSystem SN550
(2.40 GHz, Intel Xeon Gold 6240R)

<table>
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<th>SPECspeed®2017_fp_base =</th>
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<tbody>
<tr>
<td>SPECspeed®2017_fp_peak =</td>
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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<tr>
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<th>603.bwaves_s</th>
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<th>627.cam4_s</th>
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<th>628.pop2_s</th>
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<th>638.imagick_s</th>
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<th>644.nab_s</th>
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<td>0.0</td>
<td>169</td>
<td>0.0</td>
<td>272</td>
</tr>
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</table>

Hardware

CPU Name: Intel Xeon Gold 6240R
Max MHz: 4000
Nominal: 2400
Enabled: 48 cores, 2 chips
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: 35.75 MB I+D on chip per chip
Other: None
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP1 (x86_64)
Kernel 4.12.14-195-default
Compiler: C/C++: Version 19.0.5.281 of Intel C/C++
Compiler for Linux;
Fortran: Version 19.0.5.281 of Intel Fortran
Compiler for Linux
Parallel: Yes
Firmware: Lenovo BIOS Version IVE152L 2.51 released Feb-2020 tested as IVE151L 2.51 Jan-2020
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
Power Management: BIOS set to prefer performance at the cost of additional power usage
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tr>
<td>638.imagick_s</td>
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<td>89.0</td>
<td>104</td>
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<td>159</td>
<td>98.3</td>
<td>160</td>
<td>98.0</td>
<td>161</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 150
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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u5-2/lib/intel64"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-9900K CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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)

(Continued on next page)
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SPECSpeed®2017_fp_base = 150
SPECSpeed®2017_fp_peak = Not Run

General Notes (Continued)

is mitigated in the system as tested and documented.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enable
Hyper-Threading set to Disable
Trusted Execution Technology set to Enable
Patrol Scrub set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.0u5-2/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbb6e6a485a0011
running on linux-t0tj Sun Apr 12 16:45:17 2020

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 6240R CPU @ 2.40GHz
  2 "physical id"s (chips)
  48 "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 : 24
siblings : 24
physical 0: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 46 bits physical, 48 bits virtual
CPU(s): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 1
Core(s) per socket: 24
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6240R CPU @ 2.40GHz
Stepping: 7

(Continued on next page)
**Lenovo Global Technology**

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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Apr-2020  
**Hardware Availability:** Mar-2020  
**Software Availability:** Sep-2019

### Platform Notes (Continued)

- CPU MHz: 2400.000  
- CPU max MHz: 4000.0000  
- CPU min MHz: 1000.0000  
- BogoMIPS: 4800.00  
- Virtualization: VT-x  
- L1d cache: 32K  
- L1i cache: 32K  
- L2 cache: 1024K  
- L3 cache: 36608K  
- NUMA node0 CPU(s): 0-23  
- NUMA node1 CPU(s): 24-47  
- Flags: fpu vme de pse tsc msr pae 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 xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm ablp lm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pnip ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2  
- arch_capabilities

```bash
From /proc/cpuinfo cache data
   cache size : 36608 KB
```

```bash
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
   node 0 size: 193150 MB
   node 0 free: 192772 MB
   node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
   node 1 size: 193500 MB
   node 1 free: 192935 MB
   node distances:
      node 0 1
      0: 10 21
      1: 21 10
```

```bash
From /proc/meminfo
   MemTotal: 395930800 KB
   HugePages_Total: 0
   Hugepagesize: 2048 KB
```

From `/etc/*release* /etc/*version* (Continued on next page)
Platform Notes (Continued)

```
os-release:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"
```

```
uname -a:
Linux linux-t0tj 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

- CVE-2018-3620 (L1 Terminal Fault): Not affected
- Microarchitectural Data Sampling: Not affected
- CVE-2017-5754 (Meltdown): Not affected
- CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled
  via prctl and seccomp
- CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

```
run-level 3 Apr 12 16:36
```

```
SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5-2
    Filesystem Type  Size  Used Avail Use% Mounted on
/dev/sda3 xfs  893G   36G  857G   5% /
```

From /sys/devices/virtual/dmi/id
```
  BIOS:  Lenovo -[IVE151L-2.51]- 01/14/2020
  Vendor: Lenovo
  Product: ThinkSystem SN550 -[7X16CTO0WW]-
  Product Family: ThinkSystem
  Serial: 1234567890
```

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.

```
Memory:
  24x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933
```

(End of data from sysinfo program)
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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 19.0.5.281 Build 20190815 |
| 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 19.0.5.281 Build 20190815 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815 |
| 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 19.0.5.281 Build 20190815 |
| 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 19.0.5.281 Build 20190815 |
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| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815 |
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Base Compiler Invocation

C benchmarks:
icc

(Continued on next page)
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Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

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:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-qfinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-m64 -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -qfinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-qfinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-qfinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

(Continued on next page)
**SPEC CPU®2017 Floating Point Speed Result**

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**SPECspeed®2017_fp_base = 150**  
**SPECspeed®2017_fp_peak = Not Run**

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**Base Optimization Flags (Continued)**

Benchmarks using Fortran, C, and C++ (continued):
- nomalloc
- 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-G.html](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-G.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-G.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-G.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 v1.1.0 on 2020-04-12 04:45:17-0400.  