Lenovo Global Technology
ThinkSystem SN550
(1.90 GHz, Intel Xeon Gold 6238T)

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

SPECrater®2017_fp_base = 212
SPECrater®2017_fp_peak = Not Run

<table>
<thead>
<tr>
<th>Test</th>
<th>SPECrate</th>
<th>Results</th>
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<tr>
<td>503.bwaves_r</td>
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<td>507.cactuBSSN_r</td>
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<td>538.imagick_r</td>
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<td>544.nab_r</td>
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<tr>
<td>554.roms_r</td>
<td>88</td>
<td></td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Gold 6238T
Max MHz: 3700
Nominal: 1900
Enabled: 44 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: 30.25 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: SUSE Linux Enterprise Server 15 (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
Compiler for Linux
Parallel: No
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  
(1.90 GHz, Intel Xeon Gold 6238T)

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<td>95.8</td>
</tr>
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</table>

**Submit Notes**

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

**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:

LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u4/lib/intel64"

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  
runcpu command invoked through numactl i.e.:  
umactl --interleave=all runcpu <etc>

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550
(1.90 GHz, Intel Xeon Gold 6238T)

SPECraten2017_fp_base = 212
SPECraten2017_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

General Notes (Continued)

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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Trusted Execution Technology set to Enable
SNC set to Enable
CPU Frequency Limits set to Restrict Maximum Frequency
Workload Configuration set to I/O Sensitive
Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64985e45859ea9
running on linux-cq9p Thu Sep 19 16:52:07 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 6238T CPU @ 1.90GHz
    2 "physical id"s (chips)
    88 "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 : 22
    siblings : 44
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 88
On-line CPU(s) list: 0-87
Thread(s) per core: 2
Core(s) per socket: 22
Socket(s): 2
NUMA node(s): 4

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550
(1.90 GHz, Intel Xeon Gold 6238T)

<table>
<thead>
<tr>
<th>Spec CPU®2017 Floating Point Rate Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copyright 2017-2019 Standard Performance Evaluation Corporation</td>
</tr>
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</table>

**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

**SPECrate®2017_fp_base =** 212
**SPECrate®2017_fp_peak =** Not Run

### Platform Notes

**Vendor ID:** GenuineIntel
**CPU family:** 6
**Model:** 85
**Model name:** Intel(R) Xeon(R) Gold 6238T CPU @ 1.90GHz
**Stepping:** 6
**CPU MHz:** 1900.000
**CPU max MHz:** 3700.0000
**CPU min MHz:** 800.0000
**BogoMIPS:** 3800.00
**Virtualization:** VT-x
**L1d cache:** 32K
**L1i cache:** 32K
**L2 cache:** 1024K
**L3 cache:** 30976K
**NUMA node0 CPU(s):** 0-2, 6-8, 11-13, 17, 18, 44-46, 50-52, 55-57, 61, 62
**NUMA node1 CPU(s):** 3-5, 9, 10, 14-16, 19-21, 47-49, 53, 54-58, 60, 63-65
**NUMA node2 CPU(s):** 22-24, 28-30, 33-35, 39, 40, 66-68, 72-74, 77-79, 83, 84
**NUMA node3 CPU(s):** 25-27, 31, 32, 36-38, 41-43, 49-71, 75, 76, 80-82, 85-87
**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 pdelgb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperf merf perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmerf pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx1 f16c rdrand lahf_lm abml 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pinn mba ibrs ibpb tpr_shadow vmbi flexpriority ept vpid fsgsbase tsc_adjust bm1 hle avx2 smep bmi2 erms invpcid rtm cmq mpx rdt_a avx512f avx512dq rdseed adx smap cldfushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cmq_llc cmq_occult_llc cmq_mbb_total cmq_mbb_local dtherm ida arat pln pts pkp ospe avx512_vnni flush_l1d arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

<table>
<thead>
<tr>
<th>available: 4 nodes (0-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 cpus: 0 1 2 6 7 8 11 12 13 17 18 44 45 46 50 51 52 55 56 57 61 62</td>
</tr>
<tr>
<td>node 0 size: 193132 MB</td>
</tr>
<tr>
<td>node 0 free: 186946 MB</td>
</tr>
<tr>
<td>node 1 cpus: 3 4 5 9 10 14 15 16 19 20 21 47 48 49 53 54 58 59 60 63 64 65</td>
</tr>
<tr>
<td>node 1 size: 193492 MB</td>
</tr>
<tr>
<td>node 1 free: 192892 MB</td>
</tr>
<tr>
<td>node 2 cpus: 22 23 24 28 29 30 33 34 35 39 40 66 67 68 72 73 74 77 78 79 83 84</td>
</tr>
<tr>
<td>node 2 size: 193521 MB</td>
</tr>
<tr>
<td>node 2 free: 193248 MB</td>
</tr>
<tr>
<td>node 3 cpus: 25 26 27 31 32 36 37 38 41 42 43 69 70 71 75 76 80 81 82 85 86 87</td>
</tr>
<tr>
<td>node 3 size: 193518 MB</td>
</tr>
</tbody>
</table>

(Continued on next page)
Platform Notes (Continued)

node 3 free: 193247 MB
node distances:
node 0 1 2 3
  0: 10 11 21 21
  1: 11 10 21 21
  2: 21 21 10 11
  3: 21 21 11 10

From /proc/meminfo
  MemTotal: 792233164 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15"
    VERSION_ID="15"
    PRETTY_NAME="SUSE Linux Enterprise Server 15"
    ID="sles"
    ID_LIKE="suse"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
  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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Sep 19 16:51

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sdb3 xfs 893G 61G 833G 7% /

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:
Lenovo Global Technology
ThinkSystem SN550 (1.90 GHz, Intel Xeon Gold 6238T)

SPECrater®2017_fp_base = 212
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Hardware Availability: Apr-2019
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Platform Notes (Continued)

24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(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++             | 508.namd_r(base) 510.parest_r(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          | 511.povray_r(base) 526.blender_r(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,
   Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(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,
   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
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(Continued on next page)
**Lenovo Global Technology**

ThinkSystem SN550
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**SPECrater®2017_fp_base = 212**

**SPECrater®2017_fp_peak = Not Run**

**Compiler Version Notes (Continued)**

Fortran | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)

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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 | 521.wrf_r(base) 527.cam4_r(base)

---

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
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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**

C benchmarks:
```shell
icc -m64 -std=c11
```

C++ benchmarks:
```shell
icpc -m64
```

Fortran benchmarks:
```shell
ifort -m64
```

Benchmarks using both Fortran and C:
```shell
ifort -m64 icc -m64 -std=c11
```

Benchmarks using both C and C++:
```shell
icpc -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```shell
icpc -m64 icc -m64 -std=c11 ifort -m64
```

**Base Portability Flags**

503.bwaves_r: -DSPEC_LP64

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

507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
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<td>Hardware Availability:</td>
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<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>May-2019</td>
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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-F.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-F.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\textsuperscript{\textregistered}2017 v1.0.5 on 2019-09-19 04:52:06-0400.