Lenovo Global Technology
ThinkSystem SN550
(1.70 GHz, Intel Xeon Bronze 3106)

SPEC® CPU2017 Floating Point Rate Result
Copyright 2017-2018 Standard Performance Evaluation Corporation

SPECrate2017_fp_base = 59.8
SPECrate2017_fp_peak = 60.6

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base (59.8)</th>
<th>SPECrate2017_fp_peak (60.6)</th>
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<tbody>
<tr>
<td>503.bwaves_r 16</td>
<td>44.8</td>
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<td>39.1</td>
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<tr>
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<td>46.1</td>
</tr>
<tr>
<td>554.roms_r 16</td>
<td>48.4</td>
</tr>
</tbody>
</table>

Hardware
CPU Name: Intel Xeon Bronze 3106
Max MHz.: 1700
Nominal: 1700
Enabled: 16 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: 11 MB I+D on chip per chip
Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R, running at 2133)
Storage: 1 x 800 GB SAS SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 12 SP2 (x86_64)
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++
Compiler for Linux;
Fortran: Version 18.0.0.128 of Intel Fortran
Compiler for Linux
Parallel: No
Firmware: Lenovo BIOS Version IVE113W 1.12 released Feb-2018
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
**Lenovo Global Technology**  
**ThinkSystem SN550**  
(1.70 GHz, Intel Xeon Bronze 3106)

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

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**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/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"

LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4

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.:

numactl --interleave=all runcpu <etc>

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

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### 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.

### Platform Notes

**BIOS configuration:**
- Choose Operating Mode set to Maximum Performance
- DCU Streamer Prefetcher set to Disable
- SNC set to Disable
- MONITOR/MWAIT set to Enable
- LLC dead line alloc set to Disable
- Sysinfo program: /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
- Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
- running on SN550 Thu Jun 14 09:11:57 2018

**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) Bronze 3106 CPU @ 1.70GHz
2 "physical id"s (chips)
16 "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 : 8
siblings : 8
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7
```

**From lscpu:**

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Bronze 3106 CPU @ 1.70GHz
```

(Continued on next page)
Lenovo Global Technology
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Platform Notes (Continued)

Stepping: 4
CPU MHz: 1696.007
BogoMIPS: 3392.01
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
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 xtopology nonstop_tsc
aperfmpref eagerfpu pni pclmulqdq dtes64 monitor 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 avx f16c rdrand lahf_lm abm 3dnowprefetch arat epb invpcid_single pln pts
dtherm intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vnmi flexpriority
ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cqm_llc cqm_occup_llc

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
node 0 size: 386646 MB
node 0 free: 386138 MB
node 0 size: 386138 MB
node 0 free: 386138 MB
node 0 size: 386138 MB
node 0 free: 386138 MB
node 0 size: 386138 MB
node 0 free: 386138 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 792255352 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12

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**Platform Notes (Continued)**

PATCHLEVEL = 2  
# This file is deprecated and will be removed in a future service pack or release.  
# Please check /etc/os-release for details about this release.  

```diff
os-release:
  NAME="SLES"
  VERSION="12-SP2"
  VERSION_ID="12.2"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp2"
```

```bash
uname -a:
  Linux SN550 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018 (c6ce5db) x86_64
  x86_64 x86_64 GNU/Linux
run-level 3 Jun 14 09:09
```

**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 -[IVE113W-1.12]- 02/06/2018**

**Memory:**
- 24x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666, configured at 2133

*(End of data from sysinfo program)*

**Compiler Version Notes**

```plaintext
==============================================================================
CC  519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base)□
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
==============================================================================
CC   519.lbm_r(peak) 544.nab_r(peak)□
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
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**Compiler Version Notes (Continued)**

```plaintext
CXXC 508.namd_r(base) 510.parest_r(base)
-----------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

CXXC 508.namd_r(peak) 510.parest_r(peak)
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icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

CC 511.povray_r(base) 526.blender_r(base)
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icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

FC 507.cactuBSSN_r(peak)
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icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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FC  503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)
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------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc

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

C++ benchmarks:
  icpc

Fortran benchmarks:
  ifort

Benchmarks using both Fortran and C:
  ifort icc

Benchmarks using both C and C++:
  icpc icc

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

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
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_CASE_FLAG -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=3

C++ benchmarks:
  -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
  -qopt-mem-layout-trans=3
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<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
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<td>Tested by:</td>
<td>Lenovo Global Technology</td>
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<tr>
<td>Test Date:</td>
<td>Jun-2018</td>
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<tr>
<td>Hardware Availability:</td>
<td>Aug-2017</td>
</tr>
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<td>Software Availability:</td>
<td>Feb-2018</td>
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### Base Optimization Flags (Continued)

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -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=3 -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=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

### Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

Benchmarks using both Fortran and C:
-m64 -std=c11

Benchmarks using both C and C++:
-m64 -std=c11

Benchmarks using Fortran, C, and C++:
-m64 -std=c11

### Peak Compiler Invocation

C benchmarks:
icc

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550
(1.70 GHz, Intel Xeon Bronze 3106)

SPECrate2017_fp_base = 59.8
SPECrate2017_fp_peak = 60.6

Peak Compiler Invocation (Continued)

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3
538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3
544.nab_r: Same as 519.lbm_r

C++ benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3

Fortran benchmarks:
503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

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</tbody>
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### Peak Optimization Flags (Continued)

549.fotonik3d\_r: Same as 503.bwaves\_r

554.roms\_r: \-prof-gen(pass 1) \-prof-use(pass 2) \-ipo \-xCORE-AVX2 \-O3 \-no-prec-div \-qopt-prefetch \-ffinite-math-only \-qopt-mem-layout-trans=3 \-nostandard-realloc-lhs \-align array32byte

Benchmarks using both Fortran and C:
\-prof-gen(pass 1) \-prof-use(pass 2) \-ipo \-xCORE-AVX2 \-O3 \-no-prec-div \-qopt-prefetch \-ffinite-math-only \-qopt-mem-layout-trans=3 \-nostandard-realloc-lhs \-align array32byte

Benchmarks using both C and C++:
\-prof-gen(pass 1) \-prof-use(pass 2) \-ipo \-xCORE-AVX2 \-O3 \-no-prec-div \-qopt-prefetch \-ffinite-math-only \-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:
\-prof-gen(pass 1) \-prof-use(pass 2) \-ipo \-xCORE-AVX2 \-O3 \-no-prec-div \-qopt-prefetch \-ffinite-math-only \-qopt-mem-layout-trans=3 \-nostandard-realloc-lhs \-align array32byte

### Peak Other Flags

C benchmarks:
\-m64 \-std=c11

C++ benchmarks:
\-m64

Fortran benchmarks:
\-m64

Benchmarks using both Fortran and C:
\-m64 \-std=c11

Benchmarks using both C and C++:
\-m64 \-std=c11

Benchmarks using Fortran, C, and C++:
\-m64 \-std=c11
Lenovo Global Technology
ThinkSystem SN550
(1.70 GHz, Intel Xeon Bronze 3106)

SPECrate2017_fp_base = 59.8
SPECrate2017_fp_peak = 60.6

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

Test Date: Jun-2018
Hardware Availability: Aug-2017
Software Availability: Feb-2018

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html
http://www.spec.org/cpu2017/flags/Lenovo-PlatformSPECcpu2017-Flags-V1.2-SKL-C.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml
http://www.spec.org/cpu2017/flags/Lenovo-PlatformSPECcpu2017-Flags-V1.2-SKL-C.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 v1.0.2 on 2018-06-13 21:11:55-0400.
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