Lenovo Global Technology
ThinkSystem SN550 V2
(2.20 GHz, Intel Xeon Gold 6338N)

SPECrater®2017 fp_base = 366
SPECrater®2017 fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Test Date: May-2021
Hardware Availability: Jul-2021
Software Availability: Feb-2021

503.bwaves_r 64
507.cactuBSSN_r 64
508.namd_r 64
510.parest_r 64
511.povray_r 64
519.lbm_r 64
521.wrf_r 64
526.blender_r 64
527.cam4_r 64
538.imagick_r 64
544.nab_r 64
549.fotonik3d_r 64
554.roms_r 64

- SPECrater®2017 fp_base (366)

Hardware

CPU Name: Intel Xeon Gold 6338N
Max MHz: 3500
Nominal: 2200
Enabled: 64 cores, 2 chips
Orderable: 1,2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 1.25 MB I+D on chip per core
L3: 48 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.3
(Ootpa)
Kernel 4.18.0-240.el8.x86_64
Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
Compiler Build 20201113 for Linux;
Fortran: Version 2021.1 of Intel Fortran Compiler
Classic Build 20201112 for Linux;
C/C++. Version 2021.1 of Intel C/C++ Compiler
Classic Build 20201112 for Linux
Parallel: No
Firmware: Lenovo BIOS Version U8E109PT1 1.01 released Apr-2021
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: Jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance
at the cost of additional power usage
Lenovo Global Technology
ThinkSystem SN550 V2
(2.20 GHz, Intel Xeon Gold 6338N)

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

RESULTS TABLE

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</tbody>
</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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
"/home/cpu2017-1.1.5-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.5-ic202
1.1-revB/je5.0.1-64"
MALLOCS_CONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Red Hat Enterprise Linux 8.1
Transparent Huge Pages enabled by default

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550 V2
(2.20 GHz, Intel Xeon Gold 6338N)

SPECratio®2017_fp_base = 366
SPECratio®2017_fp_peak = Not Run

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

Test Date: May-2021
Hardware Availability: Jul-2021
Software Availability: Feb-2021

General Notes (Continued)

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.
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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enabled
Hyper-Threading set to Disabled
CPU P-state Control set to Legacy
C1 Enhanced Mode set to Enabled
Intel Virtualization Technology set to Disabled
SNC set to Enabled
XPT Prefetcher set to Disabled
UPI Prefetcher set to Disabled

Sysinfo program /home/cpu2017-1.1.5-ic2021.1-revB/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Thu May 20 21:47:47 2021

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 6338N CPU @ 2.20GHz
  2 "physical id"s (chips)
  64 "processors"
core, siblings (Caution: counting these is hw and system dependent. The following
extracts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 32
siblings : 32
physical 0: cores 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 28 29 30 31
(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550 V2
(2.20 GHz, Intel Xeon Gold 6338N)

SPEC CPU®2017 Floating Point Rate Result

**SPECrater®2017_fp_base** = 366
**SPECrater®2017_fp_peak** = Not Run

**CPU2017 License:** 9017
**Test Date:** May-2021
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology

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<td>May-2021</td>
<td>Jul-2021</td>
<td>Feb-2021</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

physical 1: cores 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 28 29 30 31

From `lscpu`:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 64
- On-line CPU(s) list: 0-63
- Thread(s) per core: 1
- Core(s) per socket: 32
- Socket(s): 2
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 106
- Model name: Intel(R) Xeon(R) Gold 6338N CPU @ 2.20GHz
- Stepping: 6
- CPU MHz: 3093.850
- CPU max MHz: 2201.0000
- CPU min MHz: 800.0000
- BogoMIPS: 4400.00
- Virtualization: VT-x
- L1d cache: 48K
- L1i cache: 32K
- L2 cache: 1280K
- L3 cache: 49152K
- NUMA node0 CPU(s): 0-15
- NUMA node1 CPU(s): 16-31
- NUMA node2 CPU(s): 32-47
- NUMA node3 CPU(s): 48-63
- Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc 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 pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abrdesc msr virtdep fmsb ts_dontneed svm svmctll clflushopt clwb intel_pt intel_pt aarch64sembl sha_hmac pclmulqdq dlist arch_capabilities

/proc/cpuinfo cache data
cache size : 49152 KB

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550 V2
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SPECrater®2017_fp_base = 366
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: May-2021
Tested by: Lenovo Global Technology
Software Availability: Feb-2021

Platform Notes (Continued)

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

available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
node 0 size: 126337 MB
node 0 free: 127914 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
node 1 size: 127050 MB
node 1 free: 128562 MB
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
node 2 size: 127010 MB
node 2 free: 128536 MB
node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63
node 3 size: 127288 MB
node 3 free: 128377 MB
node distances:
node 0  1  2  3
 0: 10 11 20 20
 1: 11 10 20 20
 2: 20 20 10 11
 3: 20 20 11 10

From /proc/meminfo
MemTotal: 527874272 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sbin/tuned-adm active
  Current active profile: throughput-performance
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release*/etc/*version*
os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.3 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.3"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
  ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga
Lenovo Global Technology
ThinkSystem SN550 V2
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Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

SPECrater®2017_fp_base = 366
SPECrater®2017_fp_peak = Not Run

Test Date: May-2021
Hardware Availability: Jul-2021
Software Availability: Feb-2021

Platform Notes (Continued)

uname -a:
    Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
    x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2): Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 May 20 16:32

SPEC is set to: /home/cpu2017-1.1.5-ic2021.1-revB
    Filesystem       Type Size  Used Avail Use% Mounted on
    /dev/sda4      xfs   818G   15G  803G   2% /home

From /sys/devices/virtual/dmi/id
    Vendor: Lenovo
    Product: ThinkSystem SN550 V2
    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:
    16x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200, configured at 2666

BIOS:
    BIOS Vendor: Lenovo
    BIOS Version: U8E109PT1-1.01
    BIOS Date: 04/28/2021
    BIOS Revision: 1.1
    Firmware Revision: 1.40

(Continued on next page)
Lenovo Global Technology

ThinkSystem SN550 V2
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Test Date: May-2021
Hardware Availability: Jul-2021
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Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

------------------------------------------------------------------------------
| C               | 519.libm_r(base) 538.imagick_r(base) 544.nab_r(base) |
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

------------------------------------------------------------------------------
| C++              | 508.namd_r(base) 510.parest_r(base) |
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

------------------------------------------------------------------------------
| C++, C           | 511.povray_r(base) 526.blender_r(base) |
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

------------------------------------------------------------------------------
| C++, C, Fortran  | 507.cactuBSSN_r(base) |
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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(Continued on next page)
## Lenovo Global Technology

ThinkSystem SN550 V2  
(2.20 GHz, Intel Xeon Gold 6338N)

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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
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### Compiler Version Notes (Continued)

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113 |
| Copyright (C) 1985-2020 Intel Corporation. All rights reserved. |

---

### Base Compiler Invocation

- **C benchmarks:** icx
- **C++ benchmarks:** icpx
- **Fortran benchmarks:** ifort
- **Benchmarks using both Fortran and C:** ifort icx
- **Benchmarks using both C and C++:** icpx icx
- **Benchmarks using Fortran, C, and C++:** icpx icx ifort

---

### Base Portability Flags

- `503.bwaves_r: -DSPEC_LP64`
- `507.cactuBSSN_r: -DSPEC_LP64`

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(Continued on next page)
Lenovo Global Technology
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**Base Portability Flags (Continued)**

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:
- w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
- flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- mbranches-within-32B-boundaries -ljemalloc
- L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
- w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
- mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- mbranches-within-32B-boundaries -ljemalloc
- L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:
- w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
- qopt-prefetch -ffinite-math-only
- qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4
- nostandard-realloc-lhs -align array32byte -auto
- mbranches-within-32B-boundaries -ljemalloc
- L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:
- w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
- flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
- no-prec-div -qopt-prefetch -ffinite-math-only
- qopt-multiple-gather-scatter-by-shuffles
- mbranches-within-32B-boundaries -nostandard-realloc-lhs
- align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both C and C++:
- w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math

(Continued on next page)
**Lenovo Global Technology**  
ThinkSystem SN550 V2  
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<tr>
<td>Test Sponsor</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by</td>
<td>Lenovo Global Technology</td>
</tr>
</tbody>
</table>

**SPEC CPU®2017 Floating Point Rate Result**

**SPECrate®2017_fp_base = 366**

**SPECrate®2017_fp_peak = Not Run**

**Base Optimization Flags (Continued)**

Benchmarks using both C and C++ (continued):
- `-flto`  
- `-mfpmath=sse`  
- `-funroll-loops`  
- `-qopt-mem-layout-trans=4`  
- `-ljemalloc`  
- `-L/usr/local/jemalloc64-5.0.1/lib`

Benchmarks using Fortran, C, and C++:
- `-w`  
- `-m64`  
- `-std=c11`  
- `-Wl,-z,muldefs`  
- `-xCORE-AVX512`  
- `-Ofast`  
- `-ffast-math`  
- `-flto`  
- `-mfpmath=sse`  
- `-funroll-loops`  
- `-qopt-mem-layout-trans=4`  
- `-O3`  
- `-no-prec-div`  
- `-qopt-prefetch`  
- `-ffinite-math-only`  
- `-qopt-multiple-gather-scatter-by-shuffles`  
- `-mbranches-within-32B-boundaries`  
- `-nostandard-realloc-lhs`  
- `-align array32byte`  
- `-auto`  
- `-ljemalloc`  
- `-L/usr/local/jemalloc64-5.0.1/lib`

The flags files that were used to format this result can be browsed at

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-ICElake-D.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-ICElake-D.xml)

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

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