Lenovo Global Technology
ThinkSystem SN550
(2.10 GHz, Intel Xeon Gold 6230T)

SPECraten 2017 fp base = 204
SPECraten 2017 fp peak = Not Run

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

Test Date: Sep-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Hardware

CPU Name: Intel Xeon Gold 6230T
Max MHz: 3900
Nominal: 2100
Enabled: 40 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: 27.5 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
(2.10 GHz, Intel Xeon Gold 6230T)

SPECRate®2017_fp_base = 204
SPECRate®2017_fp_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>80</td>
<td>1590</td>
<td>504</td>
<td>1591</td>
<td>504</td>
<td>1590</td>
<td>505</td>
<td>80</td>
<td>1591</td>
<td>504</td>
<td>1590</td>
<td>505</td>
<td></td>
<td></td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>80</td>
<td>595</td>
<td>170</td>
<td>595</td>
<td>170</td>
<td>595</td>
<td>170</td>
<td>80</td>
<td>595</td>
<td>170</td>
<td>595</td>
<td>170</td>
<td></td>
<td></td>
</tr>
<tr>
<td>508.namd_r</td>
<td>80</td>
<td>509</td>
<td>149</td>
<td>510</td>
<td>149</td>
<td>508</td>
<td>150</td>
<td>80</td>
<td>509</td>
<td>149</td>
<td>510</td>
<td>149</td>
<td></td>
<td></td>
</tr>
<tr>
<td>510.parest_r</td>
<td>80</td>
<td>1821</td>
<td>115</td>
<td>1825</td>
<td>115</td>
<td>1822</td>
<td>115</td>
<td>80</td>
<td>1821</td>
<td>115</td>
<td>1825</td>
<td>115</td>
<td></td>
<td></td>
</tr>
<tr>
<td>511.povray_r</td>
<td>80</td>
<td>816</td>
<td>229</td>
<td>814</td>
<td>229</td>
<td>814</td>
<td>230</td>
<td>80</td>
<td>816</td>
<td>229</td>
<td>814</td>
<td>229</td>
<td></td>
<td></td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>80</td>
<td>730</td>
<td>115</td>
<td>730</td>
<td>115</td>
<td>732</td>
<td>115</td>
<td>80</td>
<td>730</td>
<td>115</td>
<td>730</td>
<td>115</td>
<td></td>
<td></td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>80</td>
<td>877</td>
<td>204</td>
<td>863</td>
<td>208</td>
<td>874</td>
<td>205</td>
<td>80</td>
<td>877</td>
<td>204</td>
<td>863</td>
<td>208</td>
<td></td>
<td></td>
</tr>
<tr>
<td>526.blender_r</td>
<td>80</td>
<td>531</td>
<td>229</td>
<td>532</td>
<td>229</td>
<td>531</td>
<td>230</td>
<td>80</td>
<td>531</td>
<td>229</td>
<td>532</td>
<td>229</td>
<td></td>
<td></td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>80</td>
<td>617</td>
<td>227</td>
<td>620</td>
<td>226</td>
<td>620</td>
<td>226</td>
<td>80</td>
<td>617</td>
<td>227</td>
<td>620</td>
<td>226</td>
<td></td>
<td></td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>80</td>
<td>415</td>
<td>480</td>
<td>415</td>
<td>480</td>
<td>413</td>
<td>482</td>
<td>80</td>
<td>415</td>
<td>480</td>
<td>415</td>
<td>480</td>
<td></td>
<td></td>
</tr>
<tr>
<td>544.nab_r</td>
<td>80</td>
<td>385</td>
<td>350</td>
<td>386</td>
<td>349</td>
<td>378</td>
<td>356</td>
<td>80</td>
<td>385</td>
<td>350</td>
<td>386</td>
<td>349</td>
<td></td>
<td></td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>80</td>
<td>1878</td>
<td>166</td>
<td>1870</td>
<td>176</td>
<td>1874</td>
<td>166</td>
<td>80</td>
<td>1878</td>
<td>166</td>
<td>1870</td>
<td>176</td>
<td></td>
<td></td>
</tr>
<tr>
<td>554.roms_r</td>
<td>80</td>
<td>1358</td>
<td>93.6</td>
<td>1356</td>
<td>93.7</td>
<td>1355</td>
<td>93.8</td>
<td>80</td>
<td>1358</td>
<td>93.6</td>
<td>1356</td>
<td>93.7</td>
<td></td>
<td></td>
</tr>
</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"

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.:
numactl --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.
Lenovo Global Technology

ThinkSystem SN550
(2.10 GHz, Intel Xeon Gold 6230T)

SPECrate®2017_fp_base = 204
SPECrate®2017_fp_peak = Not Run

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

Test Date: Sep-2019
Hardware Availability: Jul-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 9bcde8f2999c33d61f64985e45859ea9
running on linux-cq9p Mon Sep 23 21:37:08 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 6230T CPU @ 2.10GHz
  2 "physical id"s (chips)
  80 "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 : 20
siblings : 40
physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 25 26 27 28
physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 25 26 27 28

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 80
On-line CPU(s) list: 0-79
Thread(s) per core: 2
Core(s) per socket: 20
Socket(s): 2
NUMA node(s): 4

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550
(2.10 GHz, Intel Xeon Gold 6230T)

SPECrate®2017_fp_base = 204
SPECrate®2017_fp_peak = Not Run

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

Test Date: Sep-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Platform Notes (Continued)

Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6230T CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2100.000
CPU max MHz: 3900.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-2, 5, 6, 10-12, 15, 16, 40-42, 45, 46, 49, 50-52, 55, 56
NUMA node1 CPU(s): 3, 4, 7-9, 13, 14, 17-19, 43, 44, 47-49, 53, 54, 57-59
NUMA node2 CPU(s): 20-22, 25, 26, 30-32, 35, 36, 60-62, 65, 66, 70-72, 75, 76
NUMA node3 CPU(s): 23, 24, 27-29, 33, 34, 37-39, 63, 64, 67-69, 73, 74, 77-79
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts clflushopt pebs bts rep_good nopl xtopology nonstop_tsc
cpuid髀 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single
intel_pplsn ssbd mba ibrs ibpb tpr_shadow vmni flexpriority ept vpid fsb
base rsdseed adx smep bmi2 erms invpd rtm cmq mpx rdt_a avx512f avx512dq
rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt
xsave xsetbv1 xsaves cmq_llc cmq_occup_llc cmq_mbm_total cmq_mbm_local
dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d arch_capabilities

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 5 6 10 11 12 15 16 40 41 42 45 46 50 51 52 55 56
node 0 size: 193103 MB
node 0 free: 186679 MB
node 1 cpus: 3 4 7 8 9 13 14 17 18 19 43 44 47 48 49 53 54 57 58 59
node 1 size: 193521 MB
node 1 free: 193200 MB
node 2 cpus: 20 21 22 25 26 30 31 32 35 36 60 61 62 65 66 70 71 72 75 76
node 2 size: 193521 MB
node 2 free: 193230 MB
node 3 cpus: 23 24 27 28 29 33 34 37 38 39 63 64 67 68 69 73 74 77 78 79
node 3 size: 193519 MB

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

Lenovo Global Technology
ThinkSystem SN550
(2.10 GHz, Intel Xeon Gold 6230T)

SPECrate®2017_fp_base = 204
SPECrate®2017_fp_peak = Not Run

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

Platform Notes (Continued)

node 3 free: 193241 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:      792234668 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 23 21:35

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:

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN550
(2.10 GHz, Intel Xeon Gold 6230T)

SPECrater®2017_fp_base = 204
SPECrater®2017_fp_peak = Not Run

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

Test Date: Sep-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Platform Notes (Continued)

24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
|                | 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.         |
-----------------------------------------------------------------------------

==============================================================================
|                | 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.         |
-----------------------------------------------------------------------------

==============================================================================
|                | 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.         |
| 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.         |
-----------------------------------------------------------------------------

==============================================================================
|                | 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                                   |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved.         |
-----------------------------------------------------------------------------

(Continued on next page)
Lenovo Global Technology  
ThinkSystem SN550  
(2.10 GHz, Intel Xeon Gold 6230T)  

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>204</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

Test Date: Sep-2019  
Hardware Availability: Jul-2019  
Software Availability: May-2019  

---

**Compiler Version Notes (Continued)**

<table>
<thead>
<tr>
<th>Fortran</th>
<th>503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) Fortran</td>
<td>Intel(R) 64 Compiler for applications running on Intel(R)</td>
</tr>
<tr>
<td></td>
<td>64, Version 19.0.4.227 Build 20190416</td>
</tr>
<tr>
<td>Copyright</td>
<td>(C) 1985-2019 Intel Corporation. All rights reserved.</td>
</tr>
<tr>
<td></td>
<td>------------------------------------------------------------</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fortran, C</th>
<th>521.wrf_r(base) 527.cam4_r(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) Fortran</td>
<td>Intel(R) 64 Compiler for applications running on Intel(R)</td>
</tr>
<tr>
<td></td>
<td>64, Version 19.0.4.227 Build 20190416</td>
</tr>
<tr>
<td>Copyright</td>
<td>(C) 1985-2019 Intel Corporation. All rights reserved.</td>
</tr>
<tr>
<td></td>
<td>------------------------------------------------------------</td>
</tr>
</tbody>
</table>

---

**Base Compiler Invocation**

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

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

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

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

---

**Base Portability Flags**

503.bwaves_r: -DSPEC_LP64
**SPEC CPU®2017 Floating Point Rate Result**

**Lenovo Global Technology**

ThinkSystem SN550  
(2.10 GHz, Intel Xeon Gold 6230T)  

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>204</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

**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
Lenovo Global Technology
ThinkSystem SN550
(2.10 GHz, Intel Xeon Gold 6230T)

SPECrate®2017_fp_base = 204
SPECrate®2017_fp_peak = Not Run

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

Test Date: Sep-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

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

SPEC CPU and SPECrate are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2019-09-23 09:37:08-0400.
Originally published on 2019-10-29.