Lenovo Global Technology
ThinkSystem ST550
(2.10 GHz, Intel Xeon Silver 4216)

SPECRate2017_fp_base = 168
SPECRate2017_fp_peak = Not Run

---

**Hardware**

- CPU Name: Intel Xeon Silver 4216
- Max MHz.: 3200
- Nominal: 2100
- Enabled: 32 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: 22 MB I+D on chip per chip
- Other: None
- Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)
- Storage: 1 x 480 GB SATA SSD
- Other: None

---

**Software**

- OS: SUSE Linux Enterprise Server 15 (x86_64)
- Compiler: C/C++: Version 19.0.1.144 of Intel C/C++
- Compiler Build 20181018 for Linux;
- Fortran: Version 19.0.1.144 of Intel Fortran
- Compiler Build 20181018 for Linux
- Parallel: No
- Firmware: Lenovo BIOS Version O0E135T 2.10 released Mar-2019
- System State: Run level 3 (multi-user)
- Base Pointers: 64-bit
- Peak Pointers: Not Applicable
- Other: None
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SPECraten2017_fp_base = 168
SPECraten2017_fp_peak = Not Run

Results Table

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</tbody>
</table>

SPECrate2017_fp_base = 168
SPECrate2017_fp_peak = Not Run

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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-ic19.0u1/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-7900X 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>
Yes: 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 ST550
(2.10 GHz, Intel Xeon Silver 4216)

`SPECrate2017_fp_base = 168`
`SPECrate2017_fp_peak = Not Run`

**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
- Choose Operating Mode set to Custom Mode
- LLC dead line alloc set to Disable
- SNC set to Enable
- Sysinfo program `/home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo`
- Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
- running on linux-cbcpc Sat Apr 20 06:49:09 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) Silver 4216 CPU @ 2.10GHz
- 2 "physical id"s (chips)
- 64 "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: 16
  - siblings: 32
  - physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  - physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

**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: 2
- Core(s) per socket: 16
- Socket(s): 2
- NUMA node(s): 4
- Vendor ID: GenuineIntel

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST550
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SPECrate2017_fp_base = 168
SPECrate2017_fp_peak = Not Run

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

Platform Notes (Continued)

CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4216 CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2100.000
CPU max MHz: 3200.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 22528K
NUMA node0 CPU(s): 0-3, 8-11, 32-35, 40-43
NUMA node1 CPU(s): 4-7, 12-15, 36-39, 44-47
NUMA node2 CPU(s): 16-19, 24-27, 48-51, 56-59
NUMA node3 CPU(s): 20-23, 28-31, 52-55, 60-63
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 pdelpgb rdtscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpcrf pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcms
pcid dca ssse4_1 ssse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c
rdseed vpd cmov cmovs cmovb cmovq metallic cmovw cmovs cmovb cmovq metallic cmovw cmovs cmovb cmovq
clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaves opt xsaves opt xsaves opt xsaves opt
prog mcm total mcm 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.

(Continued on next page)
## SPEC CPU2017 Floating Point Rate Result

**Lenovo Global Technology**  
ThinkSystem ST550  
(2.10 GHz, Intel Xeon Silver 4216)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<td>Hardware Availability</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Nov-2018</td>
</tr>
</tbody>
</table>

### Platform Notes (Continued)

- **node distances:**
  - 0: 10 11 21 21  
  - 1: 11 10 21 21  
  - 2: 21 21 10 11  
  - 3: 21 21 11 10

- **From /proc/meminfo**
  - MemTotal: 197697048 kB
  - HugePages_Total: 0
  - Hugepagesize: 2048 kB

- **From /etc/*release* /etc/*version***
  - 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 Apr 20 06:47**

- **SPEC is set to:** /home/cpu2017-1.0.5-ic19.0u1
  - Filesystem     Type  Size  Used Avail Use% Mounted on
  - /dev/sda3      xfs   445G  38G  408G  9% /

- **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 -[00E135T-2.10]- 03/21/2019
  - Memory:
    - 12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933, configured at 2400

(Continued on next page)
Lenovo Global Technology  
ThinkSystem ST550  
(2.10 Ghz, Intel Xeon Silver 4216)  
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CPU2017 License: 9017  
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Platform Notes (Continued)  
(End of data from sysinfo program)  

Compiler Version Notes  

CC  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 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  

CXXC 508.namd_r(base) 510.parest_r(base)  
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  

CC 511.povray_r(base) 526.blender_r(base)  
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  

FC 507.cactuBSSN_r(base)  
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
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Lenovo Global Technology
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**SPEC CPU2017 Floating Point Rate Result**

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**Test Date:** Apr-2019  
**Hardware Availability:** Apr-2019

**Test Sponsor:** Lenovo Global Technology  
**Software Availability:** Nov-2018

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### Compiler Version Notes (Continued)

```
FC  503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
---
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```
CC  521.wrf_r(base) 527.cam4_r(base)
---
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

(Continued on next page)

---

### 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 ifort -m64
```

---

### Base Portability Flags

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

(Continued on next page)
**SPEC CPU2017 Floating Point Rate Result**

**Lenovo Global Technology**

**ThinkSystem ST550**

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**SPECrate2017_fp_base = 168**

**SPECrate2017_fp_peak = Not Run**

**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. fotoni3d_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

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You can also download the XML flags sources by saving the following links:


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Tested with SPEC CPU2017 v1.0.5 on 2019-04-19 18:49:08-0400.