Lenovo Global Technology
ThinkSystem SR590
(2.10 GHz, Intel Xeon Gold 5218R)

SPECraten®2017_fp_component = 189
SPECraten®2017_fp_component = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Hardware Availability: Sep-2019
Software Availability: Sep-2019
CPU Name: Intel Xeon Gold 5218R
Max MHz: 4000
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: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)
Storage: 1 x 960 GB SATA SSD
Other: None

OS: SUSE Linux Enterprise Server 15 SP1 (x86_64)
Kernel 4.12.14-195-default
Compiler: C/C++: Version 19.0.5.281 of Intel
C/C++ Compiler for Linux;
Fortran: Version 19.0.5.281 of
Intel Fortran
Compiler for Linux
Parallel: No
Firmware: Lenovo BIOS Version TEE152L 2.51 released Feb-2020
tested as TEE151L 2.51 Jan-2020
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
Power Management: BIOS set to prefer performance at the cost of additional power usage
Lenovo Global Technology
ThinkSystem SR590
(2.10 GHz, Intel Xeon Gold 5218R)

CPU2017 License: 9017
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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</tbody>
</table>

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"

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u5/lib/intel64"

General Notes
Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR590 (2.10 GHz, Intel Xeon Gold 5218R)

<table>
<thead>
<tr>
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<tr>
<td>SPECrate®2017_fp_peak = Not Run</td>
</tr>
</tbody>
</table>

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

General Notes (Continued)

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.
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 and then set it to Custom Mode
MONITOR/MWAIT set to Enable
SNC set to Enable
Stale AtoS set to Enable
LLC dead line alloc set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.0u5/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on linux-cnti Mon Mar 16 22:35:30 2020

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 5218R 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 24 25 26 27 28
physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  Address sizes: 46 bits physical, 48 bits virtual

(Continued on next page)
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SPECrate®2017_fp_base = 189
SPECrate®2017_fp_peak = Not Run

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
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2100.000
CPU max MHz: 4000.0000
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): 0-2,5,6,10-12,15,16,40-42,45,46,50-52,55,56
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 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 fma cx16
xtr贯 pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault ebpx cat_l3 cdp_l3
invpcid_single intel_patin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaves xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mmb_total
cqm_mmb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

/platforminfo cache data
cache size : 28160 KB

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: 47999 MB
node 0 free: 47305 MB
node 1 cpus: 3 4 7 8 9 13 14 17 18 19 43 44 47 48 49 53 54 57 58 59
Platform Notes (Continued)

node 1 size: 48350 MB
node 1 free: 47907 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: 48380 MB
node 2 free: 48019 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: 48378 MB
node 3 free: 48035 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: 197743508 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="SLES"
      VERSION="15-SP1"
      VERSION_ID="15.1"
      PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
      ID="sles"
      ID_LIKE="suse"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:15:sp1"

   uname -a:
      Linux linux-cnti 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
      x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Mar 16 13:29

(Continued on next page)
### Lenovo Global Technology
ThinkSystem SR590  
(2.10 GHz, Intel Xeon Gold 5218R)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
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<tbody>
<tr>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Mar-2020  
**Hardware Availability:** Mar-2020  
**Software Availability:** Sep-2019

### Platform Notes (Continued)

- **Filesystem**  
  /dev/sda3  
  xfs  
  743G  
  33G  
  710G  
  5%  
  /

- **From /sys/devices/virtual/dmi/id**
  - **BIOS:** Lenovo -[TEE151L-2.51]- 01/13/2020  
  - **Vendor:** Lenovo  
  - **Product:** ThinkSystem SR590 -[7X98RCZ000]-  
  - **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:**
  - 4x NO DIMM NO DIMM  
  - 12x SK Hynix HMA82GR7CJR8N-WM 16 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 19.0.5.281 Build 20190815**  
**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 19.0.5.281 Build 20190815**  
**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 19.0.5.281 Build 20190815**  
**Copyright (C) 1985-2019 Intel Corporation. All rights reserved.**

(Continued on next page)
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SPECrater®2017_fp_peak = Not Run

CPU2017 License: 9017
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Hardware Availability: Mar-2020
Software Availability: Sep-2019

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR590
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Hardware Availability: Mar-2020
Software Availability: Sep-2019

Base Compiler Invocation (Continued)

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.ibm_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:
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

C++ benchmarks:
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs

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

Benchmarks using both Fortran and C:
- `-m64` `-std=c11` `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div` `-qopt-prefetch`
- `-ffinite-math-only` `-qopt-mem-layout-trans=4` `-auto`
- `-nostandard-realloc-lhs`

Benchmarks using both C and C++:
- `-m64` `-std=c11` `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div` `-qopt-prefetch`
- `-ffinite-math-only` `-qopt-mem-layout-trans=4`

Benchmarks using Fortran, C, and C++:
- `-m64` `-std=c11` `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div` `-qopt-prefetch`
- `-ffinite-math-only` `-qopt-mem-layout-trans=4` `-auto`
- `-nostandard-realloc-lhs`

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