Lenovo Global Technology
ThinkSystem SR590
(2.10 GHz, Intel Xeon Silver 4216)

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

Test Date: Apr-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Hardware
CPU Name: Intel Xeon Silver 4216
Max MHz.: 3200
Nominal: 2100
Enabled: 32 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: 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 960 GB SATA SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 12 SP4 (x86_64)
Kernel 4.12.14-94.41-default
Compiler: C/C++: Version 19.0.0.117 of Intel
C/C++ Compiler for Linux;
Fortran: Version 19.0.0.117 of Intel Fortran
Compiler for Linux
Parallel: Yes
Firmware: Lenovo BIOS Version TEE135L 2.10 released Jan-2019
File System: btrfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None

SPECspeed2017_fp_base = 113
SPECspeed2017_fp_peak = Not Run
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Results Table

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<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Threads</th>
<th>Seconds</th>
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<td>603.bwaves_s</td>
<td>32</td>
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<td>62.5</td>
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</tr>
</tbody>
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SPECspeed2017_fp_base = 113
SPECspeed2017_fp_peak = Not Run

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

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:
KMP_AFFINITIY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19/lib/intel64"
OMP_STACKSIZE = "192M"

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
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.
**Lenovo Global Technology**

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

**CPU2017 License:** 9017  
**Test Date:** Apr-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Dec-2018

**Platform Notes**

BIOS configuration:
Choose Operating Mode set to Maximum Performance  
Choose Operating Mode set to Custom Mode  
CPU P-state Control set to Automatic  
MONITOR/MWAIT set to Enable  
Hyper-Threading set to Disable  
Adjacent Cache Prefetch set to disable  
Sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9  
runtime on SR590-sles12sp4 Sun Apr 7 17:58:46 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

```plaintext
model name : Intel(R) Xeon(R) Silver 4216 CPU @ 2.10GHz  
2 "physical id"s (chips)  
32 "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 : 16  
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:

```plaintext
Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 32  
On-line CPU(s) list: 0-31  
Thread(s) per core: 1  
Core(s) per socket: 16  
Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Silver 4216 CPU @ 2.10GHz  
Stepping: 6  
CPU MHz: 2100.000  
BogoMIPS: 4200.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K
```

*(Continued on next page)*
Lenovo Global Technology

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SPEC CPU2017 Floating Point Speed Result

SPECspeed2017_fp_base = 113
SPECspeed2017_fp_peak = Not Run

CPU2017 License: 9017
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Test Date: Apr-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Platform Notes (Continued)

L3 cache: 22528K
NUMA node0 CPU(s): 0-15
NUMA node1 CPU(s): 16-31

Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts e82377p smx est tm cm tse mce pmo pbe首创
x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single ssbd mba ibrs ibpb stibp tpr_shadow vni flexpriority ept vpid
fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 3rms invpcid rtm cm qmx rdt_a avx512f
avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaves opt xsaveopt xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local
dtherm ida arat pin pts hwp_epp pku ospke avx512_vnni flush_l1d arch_capabilities

/propcpuinfo cache data
   cache size: 22528 KB

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 8 9 10 11 12 13 14 15
   node 0 size: 96357 MB
   node 0 free: 95983 MB
   node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
   node 1 size: 96712 MB
   node 1 free: 96143 MB
   node distances:
      node 0 1
      0: 10 21
      1: 21 10

From /proc/meminfo
   MemTotal: 197703848 kB
   HugePages_Total: 0
   Hugepagesize: 2048 kB

From /etc/*release*/ etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
      VERSION = 12
      PATCHLEVEL = 4
      # 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.
   os-release:
      NAME="SLES"
      VERSION="12-SP4"

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Platform Notes (Continued)

```
VERSION_ID="12.4"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp4"
```

uname -a:
(3090901) 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 7 17:15:58

SPEC is set to: /home/cpu2017-1.0.5-ic19

```
Filesystem     Type   Size  Used Avail Use% Mounted on
/dev/sda3      btrfs  740G   37G  703G   5% /home
```

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 -[TEE135L-2.10]- 01/10/2019
Memory:
4x NO DIMM NO DIMM
12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933, configured at 2400

(End of data from sysinfo program)

Compiler Version Notes

```
CC 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
```

```
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```
FC 607.cactuBSSN_s(base)
```

(Continued on next page)
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SPECspeed2017_fp_base = 113
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

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

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64
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Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

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-PlatformSPECcpu2017-Flags-V1.2-CLX-A.xml
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**SPECspeed2017_fp_base = 113**

**SPECspeed2017_fp_peak = Not Run**

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