Lenovo Global Technology
ThinkSystem SR590
(2.20 GHz, Intel Xeon Silver 4214)

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 4214
Max MHz.: 3200
Nominal: 2200
Enabled: 24 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: 16.5 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 = 93.7
SPECspeed2017_fp_peak = Not Run
Lenovo Global Technology

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**Results Table**

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<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds Base</th>
<th>Ratio</th>
<th>Seconds Peak</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>24</td>
<td>157</td>
<td>377</td>
<td>157</td>
<td>376</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>24</td>
<td>162</td>
<td>103</td>
<td>161</td>
<td>103</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>24</td>
<td>71.7</td>
<td>73.1</td>
<td>71.5</td>
<td>73.3</td>
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<tr>
<td>621.wrf_s</td>
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<td>137</td>
<td>96.5</td>
<td>137</td>
<td>96.5</td>
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<tr>
<td>627.cam4_s</td>
<td>24</td>
<td>156</td>
<td>57.0</td>
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<td>56.9</td>
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<tr>
<td>628.pop2_s</td>
<td>24</td>
<td>207</td>
<td>57.5</td>
<td>210</td>
<td>56.6</td>
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<tr>
<td>638.imagick_s</td>
<td>24</td>
<td>201</td>
<td>71.9</td>
<td>201</td>
<td>71.7</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>24</td>
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<td>135</td>
<td>130</td>
<td>135</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>24</td>
<td>131</td>
<td>69.9</td>
<td>131</td>
<td>69.7</td>
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<tr>
<td>654.roms_s</td>
<td>24</td>
<td>181</td>
<td>87.2</td>
<td>183</td>
<td>86.0</td>
</tr>
</tbody>
</table>

**SPECspeed2017_fp_base =** 93.7  
**SPECspeed2017_fp_peak =** Not Run

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**Operating System Notes**

Stack size set to unlimited using "ulimit -s unlimited"

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**General Notes**

Environment variables set by runcpu before the start of the run:

- KMP_AFFINITY = "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:

```sh
sync; echo 3>/proc/sys/vm/drop_caches
```

Yes: 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.
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**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
  - running on SR590-sles12sp4 Wed Apr 10 05:33:30 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 4214 CPU @ 2.20GHz
  - 2 "physical id"s (chips)
  - 24 "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 : 12
  - siblings : 12
  - physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
  - physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

From lscpu:
- **Architecture:** x86_64
- **CPU op-mode(s):** 32-bit, 64-bit
- **Byte Order:** Little Endian
- **CPU(s):** 24
- **On-line CPU(s) list:** 0-23
- **Thread(s) per core:** 1
- **Core(s) per socket:** 12
- **Socket(s):** 2
- **NUMA node(s):** 2
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Silver 4214 CPU @ 2.20GHz
- **Stepping:** 6
- **CPU MHz:** 2200.000
- **BogoMIPS:** 4400.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K

(Continued on next page)
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SPECspeak2017_fp_base = 93.7
SPECspeak2017_fp_peak = Not Run

CPU2017 License: 9017
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Table:
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<th>Platform Notes (Continued)</th>
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<tbody>
<tr>
<td>L3 cache: 16896K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s): 0-11</td>
</tr>
<tr>
<td>NUMA node1 CPU(s): 12-23</td>
</tr>
<tr>
<td>Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 cli flush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art 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 xtrr pdcm pcid dca sse4_1 sse4_2 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 vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ets invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pin pts hwp_epp pku ospke avx512_vnni flush_l1d arch_capabilities</td>
</tr>
</tbody>
</table>

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 |
| node 0 size: 96358 MB |
| node 0 free: 94631 MB |
| node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23 |
| node 1 size: 96713 MB |
| node 1 free: 96347 MB |
| node distances: |
| node 0 1 |
| 0: 10 21 |
| 1: 21 10 |

From /proc/meminfo
| MemTotal: 197705352 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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**SPEC CPU2017 Floating Point Speed Result**  

**SPECspeed2017_fp_base = 93.7**  
**SPECspeed2017_fp_peak = Not Run**  

**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 10 02:46

SPEC is set to: /home/cpu2017-1.0.5-ic19
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/sda3 btrfs 740G 34G 706G 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)
==============================================================================
Inte(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)
```

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Compiler Version Notes (Continued)

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.
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.
Intel(R) Fortran 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.

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
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.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-A.xml
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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2019-04-09 17:33:30-0400.  