## Lenovo Global Technology

**ThinkSystem SR630**  
(1.90 GHz, Intel Xeon Gold 5220T)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>119</th>
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<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
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<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
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<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Aug-2019</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Jul-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Oct-2018</td>
</tr>
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<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (119)</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>36</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>36</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>36</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>36</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>36</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>36</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>36</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>36</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>36</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>36</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 5220T  
- **Max MHz:** 3900  
- **Nominal:** 1900  
- **Enabled:** 36 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:** 24.75 MB I+D on chip per chip  
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)  
- **Storage:** 1 x 800 GB SATA SSD  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.6 (Maipo)  
  Kernel 3.10.0-957.el7.x86_64  
- **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 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
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>123</td>
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<td>607.cactuBSSN_s</td>
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<td>126</td>
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<td>126</td>
<td>132</td>
<td>127</td>
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<td>619.lbm_s</td>
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<td>621.wrf_s</td>
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<td>118</td>
<td>112</td>
<td>118</td>
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<tr>
<td>627.cam4_s</td>
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<td>82.6</td>
<td>107</td>
<td>82.5</td>
<td>108</td>
<td>82.2</td>
</tr>
<tr>
<td>628.pop2_s</td>
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<td>63.6</td>
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<td>638.imagick_s</td>
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<td>644.nab_s</td>
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<td>189</td>
<td>92.3</td>
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<td>189</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>36</td>
<td>112</td>
<td>81.5</td>
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<td>78.9</td>
<td>112</td>
<td>81.6</td>
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<td>654.roms_s</td>
<td>36</td>
<td>146</td>
<td>108</td>
<td>147</td>
<td>107</td>
<td>146</td>
<td>108</td>
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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.

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_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:
  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.
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LENNOVO GLOBAL TECHNOLOGY

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SPECspeed®2017_fp_peak = Not Run

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Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
C-states set to Legacy
Hyper-Threading set to Disable
Adjacent Cache Prefetch set to Disable
Stale AtoS set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d6f64985e45859ea9
running on localhost.localdomain Tue Aug 13 17:36:52 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 5220T CPU @ 1.90GHz
  2 "physical id"s (chips)
  36 "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 : 18
siblings : 18
physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 36
  On-line CPU(s) list: 0-35
  Thread(s) per core: 1
  Core(s) per socket: 18
  Socket(s): 2
  NUMA node(s): 2
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 85
  Model name: Intel(R) Xeon(R) Gold 5220T CPU @ 1.90GHz
  Stepping: 7
  CPU MHz: 1900.000
  BogoMIPS: 3800.00
  Virtualization: VT-x
  L1d cache: 32K
  L1i cache: 32K
  L2 cache: 1024K

(Continued on next page)
**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>L3 cache:</td>
<td>25344K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-17</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>18-35</td>
</tr>
<tr>
<td>Flags:</td>
<td>fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 c1flush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl pge mce cx8 apic sep tsc_deadline_timer nonstop_tsc aperfmperf eagerfpus pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrigm pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch epb cat_13 cdp_13 intel_pni intel_pt ssbd mba ibrs ibpb stibp ibrsenhance tpr_shadow vnumi flexpriority ept vpid fsgsbase tsc_adjust hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln ptk ospe avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities</td>
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From `numactl --hardware`:

<table>
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<tr>
<th>Field</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>available:</td>
<td>2 nodes (0-1)</td>
</tr>
<tr>
<td>node 0 cpus:</td>
<td>0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17</td>
</tr>
<tr>
<td>node 0 size:</td>
<td>196280 MB</td>
</tr>
<tr>
<td>node 0 free:</td>
<td>191446 MB</td>
</tr>
<tr>
<td>node 1 cpus:</td>
<td>18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35</td>
</tr>
<tr>
<td>node 1 size:</td>
<td>196608 MB</td>
</tr>
<tr>
<td>node 1 free:</td>
<td>192026 MB</td>
</tr>
<tr>
<td>node distances:</td>
<td></td>
</tr>
<tr>
<td>node 0 1</td>
<td></td>
</tr>
<tr>
<td>0: 10 21</td>
<td></td>
</tr>
<tr>
<td>1: 21 10</td>
<td></td>
</tr>
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From `/proc/meminfo`:

<table>
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<th>Field</th>
<th>Value</th>
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<tbody>
<tr>
<td>MemTotal:</td>
<td>395878480 kB</td>
</tr>
<tr>
<td>HugePages_Total:</td>
<td>0</td>
</tr>
<tr>
<td>Hugepagesize:</td>
<td>2048 kB</td>
</tr>
</tbody>
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From `/etc/*release*/`:

<table>
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<th>Field</th>
<th>Value</th>
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<tbody>
<tr>
<td>ID:</td>
<td>&quot;rhel&quot;</td>
</tr>
<tr>
<td>ID_LIKE:</td>
<td>&quot;fedora&quot;</td>
</tr>
<tr>
<td>VARIANT:</td>
<td>&quot;Server&quot;</td>
</tr>
<tr>
<td>VARIANT_ID:</td>
<td>&quot;server&quot;</td>
</tr>
<tr>
<td>VERSION:</td>
<td>&quot;7.6&quot;</td>
</tr>
<tr>
<td>PRETTY_NAME:</td>
<td>&quot;Red Hat Enterprise Linux Server 7.6 (Maipo)&quot;</td>
</tr>
</tbody>
</table>
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SPECspeed®2017_fp_peak = Not Run

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Platform Notes (Continued)

    redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
    system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)

uname -a:
    Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
    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: Load fences, __user pointer sanitization
    CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS

run-level 3 Aug 13 17:33

SPEC is set to: /home/cpu2017-1.0.5-ic19
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      xfs   689G   37G  652G   6% /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 -[IVE141E-2.30]- 07/02/2019
    Memory:
        24x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933, configured at 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<p>| C               | 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 |</p>
<table>
<thead>
<tr>
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</tr>
</thead>
</table>
==============================================================================

==============================================================================
<p>| C++, C, Fortran | 607.cactuBSSN_s(base) |
|----------------------------------------------------------------------|
| Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, |
| Version 19.0.0.117 Build 20180804 |</p>
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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) 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.

Fortran         | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
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.

Fortran, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.0.117 Build 20180804
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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.hm_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-D.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-D.xml
## SPEC CPU®2017 Floating Point Speed Result

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- **Test Date:** Aug-2019
- **Hardware Availability:** Jul-2019
- **Software Availability:** Oct-2018

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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 2019-08-13 05:36:52-0400.
Originally published on 2019-09-03.