# Lenovo Global Technology

## ThinkSystem SR630

**(3.80 GHz, Intel Xeon Gold 5222)**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>Lenovo Global Technology</th>
</tr>
</thead>
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<tr>
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<td>Apr-2019</td>
</tr>
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<td>Software Availability:</td>
<td>Oct-2018</td>
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</table>

### SPECspeed2017_fp_base = 58.6

**SPECspeed2017_fp_peak = Not Run**

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>8</td>
<td>56.1</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>8</td>
<td>46.5</td>
</tr>
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<td>619.lbm_s</td>
<td>8</td>
<td>46.1</td>
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<tr>
<td>621.wrf_s</td>
<td>8</td>
<td>29.6</td>
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<td>627.cam4_s</td>
<td>8</td>
<td>47.1</td>
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<tr>
<td>628.pop2_s</td>
<td>8</td>
<td>36.3</td>
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<tr>
<td>638.imagick_s</td>
<td>8</td>
<td>66.8</td>
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<tr>
<td>644.nab_s</td>
<td>8</td>
<td>58.2</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>8</td>
<td>54.7</td>
</tr>
</tbody>
</table>

### SPECspeed2017_fp_base (58.6)

### Hardware

- **CPU Name:** Intel Xeon Gold 5222
- **Max MHz.:** 3900
- **Nominal:** 3800
- **Enabled:** 8 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
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R)
- **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
- **Fortran:** Version 19.0.0.117 of Intel Fortran
- **Compiler for Linux:**
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version IVE135P 2.10 released Feb-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None
Lenovo Global Technology
ThinkSystem SR630
(3.80 GHz, Intel Xeon Gold 5222)

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

Test Date: May-2019
Hardware Availability: Apr-2019
Software Availability: Oct-2018

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
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<td>603.bwaves_s</td>
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<tr>
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<tr>
<td>619.lbm_s</td>
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<td>113</td>
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<td>649.fotonik3d_s</td>
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<td>292</td>
<td>1.00</td>
<td>286</td>
<td>1.00</td>
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</tbody>
</table>

SPECspeed\_2017\_fp\_base = 58.6
SPECspeed\_2017\_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_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:
  ```bash
  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.
SPEC CPU2017 Floating Point Speed Result

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</table>

**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
SNC set to Enable
Stale AtoS set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9
running on localhost.localdomain Wed May 15 12:25:11 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 5222 CPU @ 3.80GHz
- 2 "physical id"s (chips)
- 8 "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 : 4
  - siblings : 4
  - physical 0: cores 2 5 10 13
  - physical 1: cores 1 2 12 13

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 8
- On-line CPU(s) list: 0-7
- Thread(s) per core: 1
- Core(s) per socket: 4
- Socket(s): 2
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 5222 CPU @ 3.80GHz
- Stepping: 6
- CPU MHz: 3800.000
- BogoMIPS: 7600.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K

(Continued on next page)
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SPECspeed2017_fp_base = 58.6
SPECspeed2017_fp_peak = Not Run

Platform Notes (Continued)

L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,2
NUMA node1 CPU(s): 1,3
NUMA node2 CPU(s): 4,5
NUMA node3 CPU(s): 6,7
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 pdpe1gb rdtsscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpre pdcm pcd dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 intel_pt ssbd mbx
ibs ibpb stibp ibrs Enhanced tpr_shadow vmmi fpxr priority qpt vpid fsbgsbase
tsc_adjust bm1 hle avx2 smep bmi2 erms invpcid rtm cmq mpx rdt_a avx512f avx512dq
rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves xgetbv1
cmq_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pkup ospe
avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities

/proc/cpuinfo cache data

    cache size : 16896 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
different chip.
    available: 4 nodes (0-3)
    node 0 cpus: 0 2
    node 0 size: 97977 MB
    node 0 free: 95537 MB
    node 1 cpus: 1 3
    node 1 size: 98304 MB
    node 1 free: 95138 MB
    node 2 cpus: 4 5
    node 2 size: 98304 MB
    node 2 free: 96069 MB
    node 3 cpus: 6 7
    node 3 size: 98304 MB
    node 3 free: 95810 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: 395878952 KB
    HugePages_Total: 0
    Hugepagesize: 2048 KB

(Continued on next page)
Platform Notes (Continued)

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux Server"
    VERSION="7.6 (Maipo)"
    ID="rhel"
    ID_LIKE="fedora"
    VARIANT="Server"
    VARIANT_ID="server"
    VERSION_ID="7.6"
    PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
  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 May 15 10:14

SPEC is set to: /home/cpu2017-1.0.5-ic19
  Filesystem Type  Size  Used Avail Use% Mounted on
  /dev/sdb2 xfs  689G  42G  647G   7% /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 -[IVE135P-2.10]- 02/13/2019
  Memory:
    24x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933

(End of data from sysinfo program)
# Lenovo Global Technology

**Tested Hardware:**
ThinkSystem SR630  
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<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>Lenovo Global Technology</td>
<td><strong>Base Compiler Invocation</strong></td>
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</table>

## 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  
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Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.0.117 Build 20180804  
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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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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
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## Base Compiler Invocation

### C benchmarks:

```
icc -m64 -std=c11
```

### Fortran benchmarks:

```
ifort -m64
```
### Base Compiler Invocation (Continued)

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
```

### 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
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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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