# Lenovo Global Technology

**ThinkSystem SR630**

(3.20 GHz, Intel Xeon Silver 4215R)

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (79.5)</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>603</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>607</td>
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<tr>
<td>619.lbm_s</td>
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</tr>
<tr>
<td>621.wrf_s</td>
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</tr>
<tr>
<td>627.cam4_s</td>
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</tr>
<tr>
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</tr>
<tr>
<td>638.imagick_s</td>
<td>638</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>644</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>649</td>
</tr>
</tbody>
</table>

## Hardware

- **CPU Name:** Intel Xeon Silver 4215R
- **Max MHz:** 4000
- **Nominal:** 3200
- **Enabled:** 16 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:** 11 MB I+D on chip per chip
- **Other:** None
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
- **Storage:** 1 x 800 GB SATA SSD
- **Other:** None

## Software

- **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++
  - Fortran: Version 19.0.5.281 of Intel Fortran
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version IVE155L 2.61 released May-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
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Results Table

<table>
<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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<td>644.nab_s</td>
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<td>71.1</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 79.5
SPECspeed®2017_fp_peak = Not Run

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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u5/lib/intel64"
OMP_STACKSIZE = "192M"

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
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.
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SPECspeed®2017_fp_base = 79.5  
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<table>
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<tr>
<th>CPU2017 License:</th>
<th>9017</th>
<th>Test Date:</th>
<th>Jun-2020</th>
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<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Mar-2020</td>
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<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>Sep-2019</td>
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</tbody>
</table>

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**Platform Notes**

- BIOS configuration:
  - Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
  - MONITOR/MWAIT set to Enable
  - Hyper-Threading set to Disable
  - SNC set to Enable

- Sysinfo program: `/home/cpu2017-1.1.0-ic19.0u5/bin/sysinfo`
  - Rev: r6365 of 2019-08-21 295195f888a3d7edbl6e46a485a0011
  - running on linux-thtl Tue Jun 30 03:03:12 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) Silver 4215R CPU @ 3.20GHz
  - 2 "physical id"s (chips)
  - 16 "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: 8
    - siblings: 8
    - physical 0: cores 0 1 2 3 4 5 6 7
    - physical 1: cores 0 1 2 3 4 5 6 7

- 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
  - CPU(s): 16
  - On-line CPU(s) list: 0-15
  - Thread(s) per core: 1
  - Core(s) per socket: 8
  - Socket(s): 2
  - NUMA node(s): 2
  - Vendor ID: GenuineIntel
  - CPU family: 6
  - Model: 85
  - Model name: Intel(R) Xeon(R) Silver 4215R CPU @ 3.20GHz
  - Stepping: 7
  - CPU MHz: 3200.000
  - CPU max MHz: 4000.0000
  - CPU min MHz: 1000.0000
  - BogoMIPS: 6400.00
  - Virtualization: VT-x
  - L1d cache: 32K

(Continued on next page)
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**Test Date:** Jun-2020
**Hardware Availability:** Mar-2020
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**Platform Notes (Continued)**

L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrn pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abml mmx prefetch cpuid_fault epb cat_13 cdp_13
invpcid_single intel_pmm ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bml1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occcl l1c cqm_mbm_total
cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

/proc/cpuinfo cache data
cache size: 11264 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
node 0 size: 386690 MB
node 0 free: 386130 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 387040 MB
node 1 free: 386692 MB
node distances:
node 0 1
 0:  10  21
 1:  21  10

From /proc/meminfo
MemTotal: 792300428 kB
hugePages_Total: 0
hugePagesize: 2048 kB

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 15 SP1

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15-SP1"

(Continued on next page)
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SPECSpeed®2017_fp_base = 79.5
SPECSpeed®2017_fp_peak = Not Run

Platform Notes (Continued)

```plaintext
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-thtl 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, IBFB: conditional, RSB filling

run-level 3 Jun 30 02:56
SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5
Filesystem   Type  Size  Used Avail Use% Mounted on
/dev/sda2    xfs   744G   43G  701G   6% /

From /sys/devices/virtual/dmi/id
BIOS: Lenovo-[IVE155L-2.61]- 05/20/2020
Vendor: Lenovo
Product: ThinkSystem SR630-[7X01RCZ000]-
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:
24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
This system support 12 DIMMs per processor, total 24 DIMMs.
24 DIMM slots installed with 32 GB DIMM for this run,
and running at 2400 due to CPU limitation.
```
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Compiler Version Notes

==============================================================================
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 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(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.
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.
Intel(R) Fortran 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.
------------------------------------------------------------------------------

==============================================================================
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 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
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Intel(R) Fortran 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.
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.
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc

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Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

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:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-m64 -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div
 -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
   -nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
   -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
   -nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
   -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

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# **SPEC CPU®2017 Floating Point Speed Result**

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| Hardware Availability: | Mar-2020 |
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## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

- `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-I.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64_rev0.xml

http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-I.xml

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