# SPEC CPU®2017 Floating Point Speed Result

## Lenovo Global Technology

**ThinkSystem SR630 V2**  
(2.30 GHz, Intel Xeon Silver 4310T)

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

<table>
<thead>
<tr>
<th>Test Date</th>
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<tr>
<td>Sep-2021</td>
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**SPECspeed®2017_fp_base = 108**  
**SPECspeed®2017_fp_peak = Not Run**

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### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>20</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>20</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>20</td>
</tr>
<tr>
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<td>20</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>20</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>20</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>20</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>20</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>20</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>20</td>
</tr>
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### Hardware

**CPU Name:** Intel Xeon Silver 4310T  
**Max MHz:** 3400  
**Nominal:** 2300

- **Enabled:** 20 cores, 2 chips, 2 threads/core  
- **Orderable:** 1.2 chips  
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **Cache L2:** 1.25 MB I+D on chip per core  
- **Cache L3:** 15 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

---

### Software

**OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
**Kernel:** 4.18.0-240.el8.x86_64

- **Compiler:**  
  - Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;  
  - C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux

- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version AFE113D 1.10 released Sep-2021  
- **File System:** xfs
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** jemalloc memory allocator V5.0.1  
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage

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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>
<th>Seconds</th>
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</tr>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>20</td>
<td>141</td>
<td>419</td>
<td>142</td>
<td>415</td>
<td>142</td>
<td>417</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>20</td>
<td>122</td>
<td>137</td>
<td>123</td>
<td>136</td>
<td>123</td>
<td>135</td>
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<tr>
<td>619.lbm_s</td>
<td>20</td>
<td>63.6</td>
<td>82.4</td>
<td>63.7</td>
<td>82.2</td>
<td>61.7</td>
<td>84.9</td>
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<tr>
<td>621.wrf_s</td>
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<td>134</td>
<td>98.8</td>
<td>132</td>
<td>99.9</td>
<td>134</td>
<td>98.7</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>20</td>
<td>140</td>
<td>63.2</td>
<td>140</td>
<td>63.1</td>
<td>141</td>
<td>62.9</td>
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<tr>
<td>628.pop2_s</td>
<td>20</td>
<td>174</td>
<td>68.2</td>
<td>174</td>
<td>68.2</td>
<td>176</td>
<td>67.5</td>
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<tr>
<td>631.imagick_s</td>
<td>20</td>
<td>158</td>
<td>91.3</td>
<td>158</td>
<td>91.1</td>
<td>158</td>
<td>91.1</td>
</tr>
<tr>
<td>644.nab_s</td>
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<td>118</td>
<td>148</td>
<td>118</td>
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<td>20</td>
<td>105</td>
<td>87.2</td>
<td>106</td>
<td>86.2</td>
<td>105</td>
<td>86.7</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>20</td>
<td>166</td>
<td>94.6</td>
<td>166</td>
<td>94.6</td>
<td>166</td>
<td>94.6</td>
</tr>
</tbody>
</table>

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"

**Environment Variables Notes**

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

- KMP_AFFINITY = "granularity=fine,compact,1,0"
- LD_LIBRARY_PATH = "/home/cpu2017-1.1.8-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-ic2021.1-revB/je5.0.1-64"
- MALLOC_CONF = "retain:true"
- 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.

(Continued on next page)
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**Test Date:** Sep-2021  
**Hardware Availability:** Jul-2021  
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### General Notes (Continued)

jemalloc, a general purpose malloc implementation  
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  

---

### Platform Notes

**BIOS configuration:**
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode  
MONITOR/MWAIT set to Enabled  
C-States set to Legacy  
LLC Prefetch set to Enable

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16cafc64d  
running on localhost.localdomain Thu Sep 9 09:58:26 2021

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 4310T CPU @ 2.30GHz  
2 "physical id"s (chips)  
40 "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: 10  
siblings: 20  
physical 0: cores 0 1 2 3 4 5 6 7 8 9  
physical 1: cores 0 1 2 3 4 5 6 7 8 9

From lscpu from util-linux 2.32.1:  
Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 40  
On-line CPU(s) list: 0-39  
Thread(s) per core: 2  
Core(s) per socket: 10  
Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 106  
Model name: Intel(R) Xeon(R) Silver 4310T CPU @ 2.30GHz  
Stepping: 6

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

CPU MHz: 1683.899  
BogoMIPS: 4600.00  
Virtualization: VT-x  
L1d cache: 48K  
L1i cache: 32K  
L2 cache: 1280K  
L3 cache: 15360K  
NUMA node0 CPU(s): 0-9,20-29  
NUMA node1 CPU(s): 10-19,30-39  
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 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 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnop prefetch cpuid_fault epb cat_l3 invpcid_single intel_pni ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erson invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xsavec xsaveopt cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local split_lock_detect wbnoinvd dtherm ida arat pln pts avx512vmbmi umip pku ospke avx512_vbmi2 gfnl vaes vpcmldqdq avx512_vnni avx512_bitalg tme avx512_vpconfd dq la57 rdpid md_clear pconfi flush_l1d arch_capabilities

From `/proc/cpuinfo` cache data  
    cache size : 15360 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 20 21 22 23 24 25 26 27 28 29  
      node 0 size: 501422 MB  
      node 0 free: 514946 MB  
      node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39  
      node 1 size: 500972 MB  
      node 1 free: 515430 MB  
      node distances:  
        node 0 1  
          0: 10 20  
          1: 20 10

From `/proc/meminfo`  
    MemTotal: 1056494684 KB  
    HugePages_Total: 0  
    Hugepagesize: 2048 KB

/sbin/tuned-adm active  
    Current active profile: throughput-performance

(Continued on next page)
Platform Notes (Continued)

From /etc/*release* /etc/*version*
    os-release:
        NAME="Red Hat Enterprise Linux"
        VERSION="8.3 (Ootpa)"
        ID="rhel"
        ID_LIKE="fedora"
        VERSION_ID="8.3"
        PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
        ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
    Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
    x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):                        Not affected
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: usercopy/swaps
barriers and __user pointer
sanitization
CVE-2017-5715 (Spectre variant 2):                     Mitigation: Enhanced IBRS, IBPB:
conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort):               Not affected

run-level 3 Sep 9 09:56

SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/sda4   xfs   818G  23G  796G   3% /home

From /sys/devices/virtual/dmi/id
    Vendor: Lenovo
    Product: ThinkSystem SR630 V2 MB
    Product Family: ThinkSystem
    Serial: 1234567890

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Platform Notes (Continued)

Additional information from dmidecode 3.2 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:
32x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200, configured at 2666

BIOS:
- BIOS Vendor: Lenovo
- BIOS Version: AFE113D-1.10
- BIOS Date: 09/01/2021
- BIOS Revision: 1.10
- Firmware Revision: 1.12

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 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 Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000

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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000
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--------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc

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
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Base Optimization Flags

C benchmarks:
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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-ICElake-F.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-ICElake-F.xml
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

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