# SPEC CPU®2017 Floating Point Speed Result

## Lenovo Global Technology

**ThinkSystem SR630**  
**2.20 GHz, Intel Xeon Gold 5220R**

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

### SPECspeed®2017_fp_base

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>163</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>98.6</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>129</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>109</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>65.0</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>251</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>84.3</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>161</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_fp_peak

Not Run

---

**Hardware**

- **CPU Name**: Intel Xeon Gold 5220R  
- **Max MHz**: 4000  
- **Nominal**: 2200  
- **Enabled**: 48 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**: 35.75 MB I+D on chip per chip  
- **Memory**: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)  
- **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++ Compiler for Linux;  
- **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

---

**Test Date**: Jun-2020  
**Hardware Availability**: Mar-2020  
**Software Availability**: Sep-2019

---

---
**SPECP** CPU®2017 Floating Point Speed Result

**Lenovo Global Technology**

ThinkSystem SR630
(2.20 GHz, Intel Xeon Gold 5220R)

**SPEC**speed®2017_fp_base = 143

**SPEC**speed®2017_fp_peak = Not Run

---

### 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>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>48</td>
<td>117</td>
<td>504</td>
<td>118</td>
<td>500</td>
<td>118</td>
<td>500</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>48</td>
<td>102</td>
<td>163</td>
<td>102</td>
<td>163</td>
<td>103</td>
<td>162</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>48</td>
<td>53.1</td>
<td>98.6</td>
<td>53.1</td>
<td>98.6</td>
<td>53.2</td>
<td>98.5</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>48</td>
<td>102</td>
<td>129</td>
<td>102</td>
<td>129</td>
<td>102</td>
<td>129</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>48</td>
<td>81.5</td>
<td>109</td>
<td>81.6</td>
<td>109</td>
<td>81.9</td>
<td>108</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>48</td>
<td>182</td>
<td>65.2</td>
<td>184</td>
<td>64.5</td>
<td>183</td>
<td>65.0</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>48</td>
<td>101</td>
<td>143</td>
<td>101</td>
<td>142</td>
<td>101</td>
<td>143</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>48</td>
<td>69.6</td>
<td>251</td>
<td>69.5</td>
<td>251</td>
<td>69.5</td>
<td>251</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>48</td>
<td>108</td>
<td>84.3</td>
<td>109</td>
<td>83.8</td>
<td>107</td>
<td>84.9</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>48</td>
<td>97.6</td>
<td>161</td>
<td>97.6</td>
<td>161</td>
<td>96.7</td>
<td>163</td>
</tr>
</tbody>
</table>

**SPEC**speed®2017_fp_base = 143

**SPEC**speed®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"

---

### 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.
Lenovo Global Technology

ThinkSystem SR630
(2.20 GHz, Intel Xeon Gold 5220R)

SPECspeed®2017_fp_base = 143
SPECspeed®2017_fp_peak = Not Run

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

Test Date: Jun-2020
Hardware Availability: Mar-2020
Software Availability: Sep-2019

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

Sysinfo program /home/cpu2017-1.1.0-ic19.0u5/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7eddb16e46a485a0011
running on linux-thtl Mon Jun 22 01:29:49 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) Gold 5220R CPU @ 2.20GHz
  2 "physical id"s (chips)
  48 "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 : 24
siblings : 24
physical 0: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

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): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 1
Core(s) per socket: 24
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5220R CPU @ 2.20GHz
Stepping: 7
CPU MHz: 2200.000
CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR630
(2.20 GHz, Intel Xeon Gold 5220R)

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

SPECspeed®2017_fp_base = 143
SPECspeed®2017_fp_peak = Not Run

Platform Notes (Continued)

L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-23
NUMA node1 CPU(s): 24-47
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 cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrp pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abrdelay bts dtr_div tsc_adjust tsc tsc_adjust

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 12 13 14 15 16 17 18 19 20 21 22 23
node 0 size: 386686 MB
node 0 free: 385960 MB
node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
node 1 size: 387036 MB
node 1 free: 386737 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 792292328 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

From /etc/*release* /etc/*version*
os-release:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"

(Continued on next page)
Lenovo Global Technology  
ThinkSystem SR630  
(2.20 GHz, Intel Xeon Gold 5220R)  

SPECspeed®2017_fp_base = 143  
SPECspeed®2017_fp_peak = Not Run

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

Test Date: Jun-2020  
Hardware Availability: Mar-2020  
Software Availability: Sep-2019

Platform Notes (Continued)

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 22 01:28

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5

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 2666 due to CPU limitation.
Lenovo Global Technology

ThinkSystem SR630
(2.20 GHz, Intel Xeon Gold 5220R)

SPECSpeed®2017_fp_base = 143
SPECSpeed®2017_fp_peak = Not Run

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)
------------------------------------------------------------------------------
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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR630
(2.20 GHz, Intel Xeon Gold 5220R)

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

(Continued on next page)
## Lenovo Global Technology

**ThinkSystem SR630**  
(2.20 GHz, Intel Xeon Gold 5220R)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base =</th>
<th>143</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak =</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Jun-2020  
**Hardware Availability:** Mar-2020  
**Software Availability:** Sep-2019

### 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](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/Intel-ic19.0u5-official-linux64_rev0.xml)
- [http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-I.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-I.xml)