## SPEC CPU®2017 Floating Point Speed Result

**Lenovo Global Technology**

**ThinkSystem SR550**

**(2.40 GHz, Intel Xeon Silver 4214R)**

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

**Hardware**

- **CPU Name:** Intel Xeon Silver 4214R  
- **Max MHz:** 3500  
- **Nominal:** 2400  
- **Enabled:** 24 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 (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)  
- **Storage:** 1 x 960 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:**  
- **Fortran:** Version 19.0.5.281 of Intel Fortran  
- **Compiler for Linux:**  
- **Parallel:** Yes  
- **Firmware:** Lenovo BIOS Version TEE152L 2.51 released Feb-2020 tested as TEE151L 2.51 Jan-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

**SPECspeed®2017_fp_base =** 97.2

**SPECspeed®2017_fp_peak =** Not Run

| threads | 0 | 20.0 | 40.0 | 60.0 | 80.0 | 100 | 115 | 130 | 145 | 160 | 175 | 190 | 205 | 220 | 235 | 250 | 265 | 280 | 295 | 310 | 325 | 340 | 355 | 370 |
|---------|---|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 603.bwaves_s | 24 |       |      |      |      | 107 | | | | | | | | | | | | | | | | | | | | | |
| 607.cactuBSSN_s | 24 |       |      |      |      | 100 | 77.9 | | | | | | | | | | | | | | | | | | | | | |
| 619.lbm_s | 24 |       |      |      |      | 100 | 58.2 | | | | | | | | | | | | | | | | | | | | | |
| 621.wrf_s | 24 |       |      |      |      | 100 | 58.9 | | | | | | | | | | | | | | | | | | | | | |
| 627.cam4_s | 24 |       |      |      |      | 100 | 78.8 | | | | | | | | | | | | | | | | | | | | | |
| 628.pop2_s | 24 |       |      |      |      | 100 | 71.1 | | | | | | | | | | | | | | | | | | | | | |
| 638.imagick_s | 24 |       |      |      |      | 100 | 70.7 | | | | | | | | | | | | | | | | | | | | | |
| 644.nab_s | 24 |       |      |      |      | 100 | 85.4 | | | | | | | | | | | | | | | | | | | | | |
| 649.fotonik3d_s | 24 |       |      |      |      | 100 | 85.4 | | | | | | | | | | | | | | | | | | | | | |
| 654.roms_s | 24 |       |      |      |      | 100 | 85.4 | | | | | | | | | | | | | | | | | | | | | |
Lenovo Global Technology
ThinkSystem SR550
(2.40 GHz, Intel Xeon Silver 4214R)

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

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

Results Table

Benchmark | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio
---|---|---|---|---|---|---|---|---|---|---|---|---|---|---
603.bwaves_s | 24 | 157 | 377 | 158 | 373 | 159 | 372 | 24 | 157 | 377 | 158 | 373 | 159 | 372
607.cactuBSSN_s | 24 | 155 | 107 | 155 | 107 | 156 | 107 | 24 | 155 | 107 | 155 | 107 | 156 | 107
619.lbm_s | 24 | 67.1 | 78.1 | 70.0 | 74.9 | 67.2 | 77.9 | 24 | 67.1 | 78.1 | 70.0 | 74.9 | 67.2 | 77.9
621.wrf_s | 24 | 131 | 101 | 132 | 100 | 132 | 100 | 24 | 131 | 101 | 132 | 100 | 132 | 100
627.cam4_s | 24 | 152 | 58.2 | 152 | 58.2 | 152 | 58.2 | 24 | 152 | 58.2 | 152 | 58.2 | 152 | 58.2
628.pop2_s | 24 | 199 | 59.6 | 203 | 58.5 | 202 | 58.9 | 24 | 199 | 59.6 | 203 | 58.5 | 202 | 58.9
638.imagick_s | 24 | 183 | 78.9 | 189 | 76.5 | 183 | 78.8 | 24 | 183 | 78.9 | 189 | 76.5 | 183 | 78.8
644.nab_s | 24 | 119 | 147 | 119 | 147 | 119 | 147 | 24 | 119 | 147 | 119 | 147 | 119 | 147
649.fotonik3d_s | 24 | 129 | 70.9 | 129 | 70.7 | 129 | 69.1 | 24 | 129 | 70.9 | 129 | 70.7 | 129 | 69.1
654.roms_s | 24 | 185 | 85.1 | 184 | 85.6 | 184 | 85.4 | 24 | 185 | 85.1 | 184 | 85.6 | 184 | 85.4

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.
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)

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General Notes (Continued)

is mitigated in the system as tested and documented.

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 295195f888a3d7edbb1e6e46a485a0011
running on linux-h3af Mon Mar 23 15:00:00 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 4214R CPU @ 2.40GHz
  2 "physical id"s (chips)
  24 "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 : 12
  siblings : 12
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

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): 24
  On-line CPU(s) list: 0-23
  Thread(s) per core: 1
  Core(s) per socket: 12
  Socket(s): 2
  NUMA node(s): 2
  Vendor ID:     GenuineIntel
  CPU family:    6
  Model:      85
  Model name:  Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz
  Stepping:     7
  CPU MHz:     2400.000
  CPU max MHz: 3500.00000

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CPU2017 License: 9017
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CPU min MHz: 1000.0000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0-11
NUMA node1 CPU(s): 12-23
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 pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_puin ssbd mba ibrs ibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavevc xsvset svmxset cqm_llc cqm_occcll cqm_mbml_below cqm_mbml_total cqm_mbml_local dtherm ida arat pln pts pkup ospe avx512_vnni md_clear flush_lld arch_capabilities

/platform_notes

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
   node 0 size: 193123 MB
   node 0 free: 192656 MB
   node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
   node 1 size: 193533 MB
   node 1 free: 193078 MB
   node distances:
   node 0 1
   0: 10 21
   1: 21 10

From /proc/meminfo
MemTotal: 395936444 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

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SPECspeed®2017_fp_base = 97.2
SPECspeed®2017_fp_peak = Not Run

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Platform Notes (Continued)

```plaintext
VERSION="15-SP1"
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-h3af 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, IBPB: conditional, RSB filling

run-level 3 Mar 23 14:14

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u5
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 743G 32G 711G 5% /

From /sys/devices/virtual/dmi/id
BIOS: Lenovo -[TEE151L-2.51]- 01/13/2020
Vendor: Lenovo
Product: ThinkSystem SR550 -[7X03RCZ000]-
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:
12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
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Hardware Availability: Mar-2020
Software Availability: Sep-2019

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

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SPECspeed®2017_fp_peak = Not Run

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

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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<table>
<thead>
<tr>
<th>SPECs<strong>2017_fp_base</strong></th>
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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-F.html](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-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-CLX-F.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-F.xml)