# Lenovo Global Technology

## Lenovo Global Technology

**ThinkSystem SR570**  
(2.00 GHz, Intel Xeon Silver 4109T)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>59.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>60.4</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Silver 4109T  
  - **Max MHz.:** 3000  
  - **Nominal:** 2000  
  - **Enabled:** 16 cores, 2 chips  
  - **Orderable:** 1.2 chips  
  - **Cache L1:** 32 KB I + 32 KB D on chip per core  
  - **L2:** 1 MB L+D on chip per core  
  - **L3:** 11 MB L+D on chip per core  
  - **Other:** None  
  - **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)  
  - **Storage:** 1 x 800 GB SAS SSD  
  - **Other:** None  

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP3 (x86_64)  
  - **Kernel:** 4.4.73-5-default  
  - **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux;  
  - **Parallel:** Yes  
  - **Firmware:** Lenovo BIOS Version TEE119J 1.20 released Sep-2017  
  - **File System:** btrfs  
  - **System State:** Run level 3 (multi-user)  
  - **Base Pointers:** 64-bit  
  - **Peak Pointers:** 64-bit  
  - **Other:** None  

### Test Details

- **CPU2017 License:** 9017  
  - **Test Sponsor:** Lenovo Global Technology  
  - **Test Date:** Jan-2018  
  - **Hardware Availability:** Nov-2017  
  - **Tested by:** Lenovo Global Technology  
  - **Software Availability:** Sep-2017  

### Benchmark Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>69.7</td>
<td>312 69.7</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>71.6</td>
<td>312 71.6</td>
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<tr>
<td>619.lbm_s</td>
<td>16</td>
<td>31.1</td>
<td>312 31.1</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>48.4</td>
<td>312 48.4</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
<td>32.3</td>
<td>312 32.3</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
<td>43.1</td>
<td>312 43.1</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>16</td>
<td>40.4</td>
<td>312 40.4</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>16</td>
<td>73.3</td>
<td>312 73.3</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>59.7</td>
<td>312 59.7</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>63.6</td>
<td>312 63.6</td>
</tr>
</tbody>
</table>

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SPEC CPU2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SR570
(2.00 GHz, Intel Xeon Silver 4109T)

SPECspeed2017_fp_base = 59.0
SPECspeed2017_fp_peak = 60.4

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>189</td>
<td>312</td>
<td>190</td>
<td>311</td>
<td>189</td>
<td>312</td>
<td>190</td>
<td>311</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>240</td>
<td>69.5</td>
<td>239</td>
<td>69.8</td>
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<td>31.1</td>
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<td>48.3</td>
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<td>32.3</td>
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<td>638.imagick_s</td>
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<td>360</td>
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<td>152</td>
<td>59.8</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
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<td>63.5</td>
<td>248</td>
<td>63.6</td>
<td>247</td>
<td>63.8</td>
<td>247</td>
<td>63.8</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 59.0
SPECspeed2017_fp_peak = 60.4

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"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/je5.0.1-64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
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
No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
No: 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.
No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly

(Continued on next page)
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General Notes (Continued)

generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://www.spec.org/osg/policy.html

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
MONITOR/MWAIT set to Enable
Adjacent Cache Prefetch set to Disable
XPT Prefetcher set to Enable
LLC dead line alloc set to Disable
Uncore Frequency Scaling set to disable
Patrol Scrub set to disable
DCA set to enable
Per Core P-state set to disable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-3fwh Sat Jan 20 05:44:06 2018

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 4109T CPU @ 2.00GHz
       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
   CPU(s):              16

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**SPEC CPU2017 Floating Point Speed Result**

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**SPECspeed2017_fp_base = 59.0**
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**Platform Notes (Continued)**

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 4109T CPU @ 2.00GHz
Stepping: 4
CPU MHz: 1995.307
BogoMIPS: 3990.61
Virtualization: VT-x
L1d cache: 32K
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 rdtsscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl apic cpuid nonstop_tsc
aperfmpref perf eagercpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtrabw pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3nowprefetch ida arat epb pln pts dtherm intel_pt
tpr_shadow vmpartion vmpersonal fiax保存 vsnmi farsaveshape fpred pstate intel_pmxt
msr whatlib kmov clflushopt clwb avx512cd avx512bw avx512vl xSAVEOPT xsaveopt xgetbv1 cqm_11c cqm_occup_11c pku ospke

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: 96060 MB
node 0 free: 95577 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 96749 MB
node 1 free: 96433 MB
node distances:
node 0 1
 0: 10 21
 1: 21 10

From /proc/meminfo

**cache size : 11264 KB**

(Continued on next page)
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**CPU2017 License:** 9017  
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**Tested by:** Lenovo Global Technology

**Platform Notes (Continued)**

- MemTotal: 197437652 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

*From /etc/*release* /etc/*version*

```
SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)
    VERSION = 12
    PATCHLEVEL = 3
    # This file is deprecated and will be removed in a future service pack or release.
    # Please check /etc/os-release for details about this release.

os-release:
    NAME="SLES"
    VERSION="12-SP3"
    VERSION_ID="12.3"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp3"
```

```
uname -a:
    Linux linux-3fwh 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017 (b7ce4e4) x86_64
    x86_64 x86_64 GNU/Linux

run-level 3 Jan 20 05:43
```

**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 -[TEE119J-1.20]- 09/06/2017
- Memory:  
  - 4x NO DIMM NO DIMM  
  - 12x Samsung M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

---

### Compiler Version Notes

```
CC 619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
```

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR570
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SPECspeed2017_fp_base = 59.0
SPECspeed2017_fp_peak = 60.4

Compiler Version Notes (Continued)

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
CC 619.lbm_s(peak)
------------------------------------------------------------------------------

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
FC 607.cactuBSSN_s(base)
------------------------------------------------------------------------------

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
FC 607.cactuBSSN_s(peak)
------------------------------------------------------------------------------

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
------------------------------------------------------------------------------

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
FC 603.bwaves_s(peak) 649.fotonik3d_s(peak) 654.roms_s(peak)
------------------------------------------------------------------------------

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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SPECspeed2017_fp_peak = 60.4

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Tested by: Lenovo Global Technology

Test Date: Jan-2018
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Compiler Version Notes (Continued)

==============================================================================
CC  621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================

CC  621.wrf_s(peak) 628.pop2_s(peak)
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

==============================================================================

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 byte trailing
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64

(Continued on next page)
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SPECspeed2017_fp_base = 59.0
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Base Portability Flags (Continued)

649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX2 -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-AVX2 -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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Base Other Flags

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

Benchmarks using both Fortran and C:
-m64 -std=c11

Benchmarks using Fortran, C, and C++:
-m64 -std=c11
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CPU2017 License: 9017
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Tested by: Lenovo Global Technology

Test Date: Jan-2018
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Software Availability: Sep-2017

Peak 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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP

638.imagick_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP

644.nab_s: Same as 638.imagick_s

Fortran benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp

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Test Date: Jan-2018
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Peak Optimization Flags (Continued)

621.wrf_s (continued):
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
-prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -qopt-prefetch
-ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
-align array32byte

Peak Other Flags

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

Benchmarks using both Fortran and C:
-m64 -std=c11

Benchmarks using Fortran, C, and C++:
-m64 -std=c11

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-A.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.2 on 2018-01-19 16:44:05-0500.
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