# SPEC® CPU2017 Floating Point Speed Result

## Lenovo Global Technology

**ThinkSystem SR570**  
*(2.60 GHz, Intel Xeon Silver 4112)*

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Lenovo Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>9017</strong></td>
<td><strong>Lenovo Global Technology</strong></td>
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<table>
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<tr>
<th>Tested by</th>
<th>Lenovo Global Technology</th>
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</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Silver 4112  
- **Max MHz.:** 3000  
- **Nominal:** 2600  
- **Enabled:** 8 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:** 8.25 MB I+D on chip per chip  
- **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++  
  - Fortran: Version 18.0.0.128 of Intel Fortran  
- **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

## Table

<table>
<thead>
<tr>
<th>Program</th>
<th>8 Threads</th>
<th>12 Threads</th>
<th>24 Threads</th>
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**SPECspeed2017_fp_base = 40.6**  
**SPECspeed2017_fp_peak = 41.6**

**Test Date:** Jan-2018  
**Hardware Availability:** Nov-2017  
**Software Availability:** Sep-2017
Lenovo Global Technology
ThinkSystem SR570
(2.60 GHz, Intel Xeon Silver 4112)

SPECspeed2017_fp_base = 40.6
SPECspeed2017_fp_peak = 41.6

Results Table

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SPECspeed2017_fp_base = 40.6
SPECspeed2017_fp_peak = 41.6

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)
**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
  - MONITORM/WAIT 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 96c45e4568ad54c135fd618b0c91c0f
  - running on linux-uru4 Wed Jan 17 23:33:29 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 4112 CPU @ 2.60GHz
  - 2 "physical id"s (chips)
  - 8 "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: 4
    - siblings: 4
    - physical 0: cores 1 2 3 4
    - physical 1: cores 1 2 4 5

- From lscpu:
  - Architecture: x86_64
  - CPU op-mode(s): 32-bit, 64-bit
  - Byte Order: Little Endian
  - CPU(s): 8

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR570
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**Platform Notes (Continued)**

- **On-line CPU(s) list:** 0-7
- **Thread(s) per core:** 1
- **Core(s) per socket:** 4
- **Socket(s):** 2
- **NUMA node(s):** 2
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Silver 4112 CPU @ 2.60GHz
- **Stepping:** 4
- **CPU MHz:** 2593.924
- **BogoMIPS:** 5187.84
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 8448K
- **NUMA node0 CPU(s):** 0-3
- **NUMA node1 CPU(s):** 4-7
- **Flags:** fpu vme de pse mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpl mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmpref eagergpu 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 3dnowprefetch ida arat epb pln pts dtherm intel_pt tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 3dnow invpcid rtm cqm mpx avx512f avx512d avx512qd rdseed adx smap clflushopt clwb avx512cd avx512bw avx512v1 xsaveopt xsaveprec xgetbv1 cqm_llc cqm_occu_llc pku ospke

```
/proc/cpuinfo cache data
  cache size : 8448 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
- **node 0 size:** 96060 MB
- **node 0 free:** 95676 MB
- **node 1 cpus:** 4 5 6 7
- **node 1 size:** 96750 MB
- **node 1 free:** 96390 MB
- **node distances:**

```
  node 0 1
  0: 10 21
  1: 21 10
```

From `/proc/meminfo`

---

(Continued on next page)
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SPECspeed2017_fp_base = 40.6
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Platform Notes (Continued)

MemTotal: 197438692 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-uru4 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 17 23:32

SPEC is set to: /home/cpu2017.1.0.2.ic18.0

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

Compiler Version Notes

-----------------------
CC 619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
-----------------------
Lenovo Global Technology
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(2.60 GHz, Intel Xeon Silver 4112)

SPECspeed2017_fp_base = 40.6
SPECspeed2017_fp_peak = 41.6

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.

==============================================================================
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**Compiler Version Notes (Continued)**

```text
==============================================================================
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 byterecl
- 638.imagick_s: -DSPEC_LP64
- 644.nab_s: -DSPEC_LP64

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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
Lenovo Global Technology

ThinkSystem SR570
(2.60 GHz, Intel Xeon Silver 4112)

SPECspeed2017_fp_base = 40.6
SPECspeed2017_fp_peak = 41.6

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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR570
(2.60 GHz, Intel Xeon Silver 4112)

SPECspeed2017_fp_base = 40.6
SPECspeed2017_fp_peak = 41.6

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.

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