## Lenovo Global Technology

**ThinkSystem SR570**  
(2.10 GHz, Intel Xeon Silver 4116)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>75.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>77.3</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Silver 4116  
  - Max MHz.: 3000  
  - Nominal: 2100  
  - 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  
  - 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: Fortran: Version 18.0.0.128 of Intel Fortran  
  - 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 Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>SPECspeed2017_fp_peak</th>
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<tbody>
<tr>
<td>bwaves_s</td>
<td>24</td>
<td>95.9</td>
<td>77.3</td>
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<tr>
<td>cactuBSSN_s</td>
<td>24</td>
<td>34.7</td>
<td>64.3</td>
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<tr>
<td>lbm_s</td>
<td>24</td>
<td>34.7</td>
<td>60.4</td>
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<tr>
<td>wrf_s</td>
<td>24</td>
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<tr>
<td>cam4_s</td>
<td>24</td>
<td>47.6</td>
<td>60.1</td>
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<td>pop2_s</td>
<td>24</td>
<td>52.2</td>
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<tr>
<td>imagick_s</td>
<td>24</td>
<td>61.3</td>
<td>111</td>
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<tr>
<td>nab_s</td>
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<td>111</td>
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<tr>
<td>fotnik3d_s</td>
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<td>68.1</td>
<td>79.1</td>
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<tr>
<td>roms_s</td>
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<th>Ratio</th>
<th>Seconds</th>
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<tr>
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<td>644.nab_s</td>
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<td>24</td>
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<td>111</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>199</td>
<td>79.2</td>
<td>24</td>
<td>187</td>
<td>84.1</td>
<td>190</td>
<td>83.0</td>
</tr>
</tbody>
</table>

### 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
```

## Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance

Hyper-Threading set to Disable

MONITORMWAIT 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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR570
(2.10 GHz, Intel Xeon Silver 4116)

SPECspeed2017_fp_base = 75.9
SPECspeed2017_fp_peak = 77.3

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

Test Date: Dec-2017
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Platform Notes (Continued)

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 96c45e45f68ad54c135fd618bcc9f1c0f
running on linux-3fwh Fri Dec 15 12:16:03 2017

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 4116 CPU @ 2.10GHz
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
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 4116 CPU @ 2.10GHz
Stepping: 4
CPU MHz: 2095.071
BogoMIPS: 4190.14
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 mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp

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Lenovo Global Technology  
ThinkSystem SR570  
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**SPEC CPU2017 Floating Point Speed Result**

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---

**Platform Notes (Continued)**

```
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc 
aperfmpref eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtrr 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
ermr invpcid rtm cmpxcmpxchg8b avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 cmpxchg8b cmpxchgw cmpxchgl cmp
```

```
From /proc/cpuinfo  
cache size: 16896 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 10 11 |
| node 0 | size: 96059 MB |
| node 0 | free: 95640 MB |
| node 1 | cpus: 12 13 14 15 16 17 18 19 20 21 22 23 |
| node 1 | size: 96749 MB |
| node 1 | free: 96318 MB |

```
node distances:

| node | 0 1 |
| 0   | 10 21 |
| 1   | 21 10 |
```

```
From /proc/meminfo

MemTotal: 197436072 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:
```

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CPU2017 License: 9017  
Test Sponsor: Lenovo Global Technology  
Test Date: Dec-2017  

Hardware Availability: Nov-2017  
Software Availability: Sep-2017

Platform Notes (Continued)

Linux linux-3fw 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 Dec 15 12:15  

SPEC is set to: /home/cpu2017.1.0.2.ic18.0  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda2 btrfs 744G 20G 724G 3% /home  

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

==============================================================================
<table>
<thead>
<tr>
<th>CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)</th>
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| icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved. |
<table>
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<tr>
<td>FC  607.cactuBSSN_s(base)</td>
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Compiler Version Notes (Continued)

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Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
| ifort (IFORT) 18.0.0 20170811 |
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**SPEC CPU2017 Floating Point Speed Result**

**Lenovo Global Technology**

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(2.10 GHz, Intel Xeon Silver 4116)

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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
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**Test Date:** Dec-2017  
**Hardware Availability:** Nov-2017  
**Software Availability:** Sep-2017

---

**Base Compiler Invocation**

C benchmarks:  
```bash
icc
```

Fortran benchmarks:  
```bash
ifort
```

Benchmarks using both Fortran and C:  
```bash
ifort icc
```

Benchmarks using Fortran, C, and C++:  
```bash
icpc icc ifort
```

---

**Base Portability Flags**

603.bwaves_s: -DSPEC_LP64  
607.ghostkrona_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

(Continued on next page)

---

**Base Optimization Flags**

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

Fortran benchmarks:  
```bash
-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:  
```bash
-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
```

(Continued on next page)

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---

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**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

---

### Base Optimization Flags (Continued)

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`

---

### 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
Lenovo Global Technology
ThinkSystem SR570 (2.10 GHz, Intel Xeon Silver 4116)

**SPECspeed2017_fp_base** = 75.9
**SPECspeed2017_fp_peak** = 77.3

### 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
-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
```

(Continued on next page)
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**ThinkSystem SR570**  
(2.10 GHz, Intel Xeon Silver 4116)

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<th>SPECspeed2017_fp_base</th>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

#### Peak Other Flags (Continued)

- 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:

- [Intel-ic18.0-official-linux64.html](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:

- [Intel-ic18.0-official-linux64.xml](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml)
- [Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-A.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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