# Lenovo Global Technology

## ThinkSystem SR530

(2.20 GHz, Intel Xeon Gold 5120T)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>85.4</th>
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</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>86.8</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 5120T  
- **Max MHz.:** 3200
- **Nominal:** 2200
- **Enabled:** 28 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:** 19.25 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)
- **Storage:** 1 x 800 GB SAS SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP2 (x86_64)  
  - Kernel 4.4.114-92.64-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
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version TEE119R 1.22 released Feb-2018
- **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
- **Tested by:** Lenovo Global Technology
- **Test Date:** May-2018
- **Hardware Availability:** Aug-2017
- **Software Availability:** Feb-2018

### Performance Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tr>
<td>603.bwaves_s</td>
<td>28</td>
<td>36.8</td>
<td>36.9</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>28</td>
<td>64.7</td>
<td>69.3</td>
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<tr>
<td>619.ibm_s</td>
<td>28</td>
<td>60.1</td>
<td>60.0</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>28</td>
<td>50.3</td>
<td>52.8</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>28</td>
<td>75.1</td>
<td>74.7</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>28</td>
<td>67.8</td>
<td>66.2</td>
</tr>
<tr>
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<td>28</td>
<td>92.1</td>
<td>97.5</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>28</td>
<td>134</td>
<td>134</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>28</td>
<td>92.1</td>
<td>97.5</td>
</tr>
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SPEC CPU2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SR530
(2.20 GHz, Intel Xeon Gold 5120T)

CPU2017 License: 9017
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Results Table

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<thead>
<tr>
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<tr>
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<tr>
<td>619.lbm_s</td>
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<td>91.7</td>
<td>171</td>
<td>92.3</td>
<td>171</td>
<td>92.1</td>
<td>161</td>
<td>97.6</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 85.4
SPECspeed2017_fp_peak = 86.8

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
Yes: 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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disable

(Continued on next page)
**Platform Notes (Continued)**

MONITORMWAIT set to Enable
Trusted Execution Technology set to Enable
DCU Streamer Prefetcher set to Disable
DCA set to Enable
Stale AtoS set to Enable
LLC dead line alloc set to Enable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bacc091c0f
running on linux-ickx Fri May 18 03:45:41 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) Gold 5120T CPU @ 2.20GHz
  2 "physical id"s (chips)
  28 "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: 14
  siblings: 14
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 28
  On-line CPU(s) list: 0-27
  Thread(s) per core: 1
  Core(s) per socket: 14
  Socket(s): 2
  NUMA node(s): 2
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 85
  Model name: Intel(R) Xeon(R) Gold 5120T CPU @ 2.20GHz
  Stepping: 4
  CPU MHz: 2194.841
  BogoMIPS: 4389.68
  Virtualization: VT-x
  L1d cache: 32K
  L1i cache: 32K
  L2 cache: 1024K
  L3 cache: 19712K

(Continued on next page)
<table>
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<th>SPECspeed2017_fp_base = 85.4</th>
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<td>SPECspeed2017_fp_peak = 86.8</td>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

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**Platform Notes (Continued)**

```
NUMA node0 CPU(s):     0-13  
NUMA node1 CPU(s):     14-27  
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  
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc  
aperfmrperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg  
fma cx16 xptr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes  
xsave avx f16c rdrand lahf_lm abml3nowperf fetch ida arat epb invpcid_single pln pts  
dtherm intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vmx flexpriority  
ept vrid fsgsbase tsc_adjust bni hle avx2 smep bmi1 erms invpcid rtm cqm mpx  
avx512f avx512dq rdseed adx clflushopt clwb avx512cd avx512bw avx512vl xsaveopt  
xsaves xgetbv1 cqm_llc cqm_occup_llc  
```

```
From /proc/cpuinfo cache data  
cache size : 19712 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 12 13  
node 0 size: 193100 MB  
node 0 free: 190562 MB  
node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27  
node 1 size: 193504 MB  
node 1 free: 192589 MB  
node distances:  
node 0 1  
0: 10 21  
1: 21 10  
```

```
From /proc/meminfo  
MemTotal:       395883480 kB  
HugePages_Total:       0  
Hugepagesize:       2048 kB  
```

```
From /etc/*release* /etc/*version*  
SuSE-release:  
SUSE Linux Enterprise Server 12 (x86_64)  
VERSION = 12  
PATCHLEVEL = 2  
# 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-SP2"  
VERSION_ID="12.2"  
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"  
```

(Continued on next page)
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SPECspeed2017_fp_base = 85.4
SPECspeed2017_fp_peak = 86.8

CPU2017 License: 9017
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Platform Notes (Continued)

ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
    Linux linux-ickx 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018 (c6ce5db)
    x86_64 x86_64 x86_64 GNU/Linux

run-level 3 May 17 21:53

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

Filesystem     Type   Size  Used Avail Use% Mounted on
/dev/sda2      btrfs  744G  237G  507G  32% /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 -[TEE119R-1.22]- 02/06/2018
Memory:
    12x Hynix HMA84GR7AFR4N-VK 32 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)
==============================================================================
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
(Continued on next page)
## SPEC CPU2017 Floating Point Speed Result

**Lenovo Global Technology**  
ThinkSystem SR530  
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<th>Hardware Availability</th>
<th>Software Availability</th>
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<tbody>
<tr>
<td>May-2018</td>
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### Compiler Version Notes (Continued)

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

- **ifort (IFORT) 18.0.0 20170811**
- **icc (ICC) 18.0.0 20170811**
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- **ifort (IFORT) 18.0.0 20170811**
- **icc (ICC) 18.0.0 20170811**

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**FC 607.cactuBSSN_s(peak)**

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**icpc (ICC) 18.0.0 20170811**

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

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

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**ifort (IFORT) 18.0.0 20170811**

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---

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

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**ifort (IFORT) 18.0.0 20170811**

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---

**CC 621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)**

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**ifort (IFORT) 18.0.0 20170811**

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**icc (ICC) 18.0.0 20170811**

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**CC 621.wrf_s(peak) 628.pop2_s(peak)**

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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
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

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**SPEC CPU2017 Floating Point Speed Result**

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### 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
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ThinkSystem SR530
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### 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)
Lenovo Global Technology

ThinkSystem SR530
(2.20 GHz, Intel Xeon Gold 5120T)

<table>
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<th>Test Date: May-2018</th>
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<td>Software Availability: Feb-2018</td>
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**SPECspeed2017_fp_base** = 85.4

**SPECspeed2017_fp_peak** = 86.8

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
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-C.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-C.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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