# SPEC® CPU2017 Floating Point Speed Result

**Lenovo Global Technology**

ThinkSystem ST550
(2.50 GHz, Intel Xeon Silver 4215)

**Specspeed2017_fp_base** = 77.9

**Specspeed2017_fp_peak** = Not Run

<table>
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<th>Threads</th>
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<tr>
<td>607.cactuBSSN_s</td>
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<tr>
<td>619.lbm_s</td>
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</tr>
<tr>
<td>621.wrf_s</td>
<td>16</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
</tr>
<tr>
<td>628.pop2_s</td>
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<tr>
<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
</tr>
<tr>
<td>654.roms_s</td>
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</tr>
</tbody>
</table>

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**Hardware**

- **CPU Name**: Intel Xeon Silver 4215
- **Max MHz.**: 3500
- **Nominal**: 2500
- **Enabled**: 16 cores, 2 chips, 2 threads/core
- **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**: 11 MB I+D on chip per chip
- **Other**: None
- **Memory**: 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
- **Storage**: 1 x 480 GB SATA SSD
- **Other**: None

**Software**

- **OS**: Red Hat Enterprise Linux Server release 7.6 (Maipo)
- **Kernel**: 3.10.0-957.el7.x86_64
- **Compiler**: C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux;
  Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
- **Parallel**: Yes
- **Firmware**: Lenovo BIOS Version O0E135M 2.10 released Jan-2019
- **File System**: btrfs
- **System State**: Run level 3 (multi-user)
- **Base Pointers**: 64-bit
- **Peak Pointers**: Not Applicable
- **Other**: None
SPEC CPU2017 Floating Point Speed Result

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

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Results Table

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SPECspeed2017_fp_base = 77.9
SPECspeed2017_fp_peak = Not Run

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:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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.
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) is mitigated in the system as tested and documented.
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Apr-2019
Hardware Availability: Apr-2019
Tested by: Lenovo Global Technology
Software Availability: Nov-2018

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
CPU P-state Control set to Cooperative
C-States set to legacy
Adjacent Cache Prefetcher set to Disable
DCU Streamer Prefetcher set to Disable
DCA set to Disable
Uncore Frequency Turbo set to Disable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9
running on localhost.localdomain Tue Apr 23 01:02:26 2019

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 4215 CPU @ 2.50GHz
  2 "physical id"s (chips)
  32 "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 : 16
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): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
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 4215 CPU @ 2.50GHz
Stepping: 6
CPU MHz: 3292.846
CPU max MHz: 3500.0000
CPU min MHz: 1000.0000
BogoMIPS: 5000.00

(Continued on next page)
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**SPECspeed2017_fp_base = 77.9**

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**Platform Notes (Continued)**

- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 11264K
- **NUMA node0 CPU(s):** 0-7,16-23
- **NUMA node1 CPU(s):** 8-15,24-31
- **Flags:** fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
- **/proc/cpuinfo cache data**
  - Cache size: 11264 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 16 18 19 20 21 22 23
  - node 0 size: 196281 MB
  - node 0 free: 191450 MB
  - node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
  - node 1 size: 196608 MB
  - node 1 free: 191877 MB
  - node distances:
    - node 0: 1
    - node 1: 21
- **From /proc/meminfo**
  - MemTotal: 395880232 KB
  - HugePages_Total: 0
  - Hugepagesize: 2048 KB
- **os-release:**
  - NAME="Red Hat Enterprise Linux Server"
  - VERSION="7.6 (Maipo)"
  - ID="rhel"

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**Platform Notes (Continued)**

```bash
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.6"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)

uname -a:
Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CVE-2017-5754 (Meltdown):          Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS

run-level 3 Apr 23 01:00

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
```

**Compiled Notes**

```bash
Filesystem     Type   Size  Used Avail Use% Mounted on
/dev/sdb2      btrfs  442G   29G  412G   7% /
```

(End of data from sysinfo program)

---

**Compiler Version Notes**

```
CC  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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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## Lenovo Global Technology

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### Compiler Version Notes (Continued)

```plaintext
FC 607.cactuBSSN_s(base)  
---------------------------------------------------------------------  
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
---------------------------------------------------------------------  
FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)  
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
---------------------------------------------------------------------
```

### Base Compiler Invocation

**C benchmarks:**

```bash
icc -m64 -std=c11
```

**Fortran benchmarks:**

```bash
ifort -m64
```

**Benchmarks using both Fortran and C:**

```bash
ifort -m64 icc -m64 -std=c11
```

**Benchmarks using Fortran, C, and C++:**

```bash
icpc -m64 icc -m64 -std=c11 ifort -m64
```
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**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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:  
-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:  
-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++:  
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-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-A.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-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 v1.0.5 on 2019-04-22 13:02:26-0400.
