**SPEC® CPU2017 Floating Point Speed Result**

Lenovo Global Technology  
ThinkSystem ST550  
(2.30 GHz, Intel Xeon Gold 5218N)

**SPECspeed2017_fp_base = 118**  
**SPECspeed2017_fp_peak = Not Run**

| Test Date: | Apr-2019 |
| Hardware Availability: | Apr-2019 |
| Software Availability: | Nov-2018 |

<table>
<thead>
<tr>
<th>CPUs</th>
<th>128 cores, 2 chips, 2 threads/core</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>22 MB I+D on chip per chip</td>
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</tbody>
</table>

**Thread Results**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>32 Threads</th>
<th>64 Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>128</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>86.2</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>115</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>71.8</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>64.0</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>97.4</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>180</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>78.9</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>144</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>SPECspeed2017_fp_base (118)</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 5218N  
- **Max MHz.:** 3700  
- **Nominal:** 2300  
- **Enabled:** 32 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:** 22 MB I+D on chip per chip  
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)  
- **Storage:** 1 x 800 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 O0E135T 2.10 released Mar-2019  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None
Lenovo Global Technology
ThinkSystem ST550
(2.30 GHz, Intel Xeon Gold 5218N)

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

Test Date: Apr-2019
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>32</td>
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</tbody>
</table>

**SPECspeed2017_fp_base = 118**

**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.
**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 9bcde8f2999c33d61f64985e45859ea9
  - running on localhost.localdomain Fri Apr 26 23:14:45 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) Gold 5218N CPU @ 2.30GHz`
  - `2 "physical id"s (chips)`
  - `64 "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 : 16`
    - `siblings : 32`
    - `physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15`
    - `physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15`

- From `lscpu`:
  - `Architecture: x86_64`
  - `CPU op-mode(s): 32-bit, 64-bit`
  - `Byte Order: Little Endian`
  - `CPU(s): 64`
  - `On-line CPU(s) list: 0-63`
  - `Thread(s) per core: 2`
  - `Core(s) per socket: 16`
  - `Socket(s): 2`
  - `NUMA node(s): 2`
  - `Vendor ID: GenuineIntel`
  - `CPU family: 6`
  - `Model: 85`
  - `Model name: Intel(R) Xeon(R) Gold 5218N CPU @ 2.30GHz`
  - `Stepping: 6`
  - `CPU MHz: 2550.158`
  - `CPU max MHz: 3900.0000`
  - `CPU min MHz: 1000.0000`
  - `BogoMIPS: 4600.00`
**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>Virtualization:</th>
<th>VT-x</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d cache:</td>
<td>32K</td>
</tr>
<tr>
<td>L1i cache:</td>
<td>32K</td>
</tr>
<tr>
<td>L2 cache:</td>
<td>1024K</td>
</tr>
<tr>
<td>L3 cache:</td>
<td>22528K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-15,32-47</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>16-31,48-63</td>
</tr>
<tr>
<td>Flags:</td>
<td>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 aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpmr pdcmt pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ebpx cat_13 cdp_13 intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnni flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrn invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_kpg_req pku ospke avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities</td>
</tr>
</tbody>
</table>

```
/cproc/cpuinfo cache data
  cache size : 22528 KB
```

From `/proc/cpuinfo`:
```
  cache size : 22528 KB
```

From `/proc/meminfo`:
```
  MemTotal: 197698952 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB
```

From `/etc/*release*`:
```
  NAME="Red Hat Enterprise Linux Server"
```

(Continued on next page)
### Lenovo Global Technology

**ThinkSystem ST550**  
(2.30 GHz, Intel Xeon Gold 5218N)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>118</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

#### Platform Notes ( Continued )

```bash
VERSION="7.6 (Maipo)"
ID="rhel"
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)
```

```bash
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

```bash
run-level 3 Apr 26 21:04
```

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

```bash
Filesystem     Type  Size  Used Avail Use% Mounted on  
/dev/sdc3      xfs   691G   31G  661G   5% /
```

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 -[00E135T-2.10]- 03/21/2019
- Memory: 12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933, configured at 2666

(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.
---
(Continued on next page)"
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
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Test Date: Apr-2019
Hardware Availability: Apr-2019
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Compiler Version Notes (Continued)

==============================================================================
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) 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:
  icc -m64 -std=c11

Fortran benchmarks:
  ifort -m64

Benchmarks using both Fortran and C:
  ifort -m64 icc -m64 -std=c11
## Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:
```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

## 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
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- **Test Date:** Apr-2019
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The flags files that were used to format this result can be browsed at:

You can also download the XML flags sources by saving the following links:

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Tested with SPEC CPU2017 v1.0.5 on 2019-04-26 11:14:44-0400.