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

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

Hardware
CPU Name: Intel Xeon Gold 5218
Max MHz.: 3900
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
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)
Storage: 1 x 480 GB SATA SSD
Other: None

Software
OS: Red Hat Enterprise Linux Server release 7.6 (Maipo)
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

SPECspeed2017_fp_base = 118
SPECspeed2017_fp_peak = Not Run
Lenovo Global Technology
ThinkSystem ST550
(2.30 GHz, Intel Xeon Gold 5218)

SPECspeed2017_fp_base = 118
SPECspeed2017_fp_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Baseline</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>125</td>
<td>470</td>
<td>125</td>
<td>471</td>
<td>125</td>
<td>471</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>135</td>
<td>124</td>
<td>135</td>
<td>123</td>
<td>134</td>
<td>125</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>59.5</td>
<td>88.0</td>
<td>59.7</td>
<td>87.7</td>
<td>59.6</td>
<td>87.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>116</td>
<td>114</td>
<td>116</td>
<td>114</td>
<td>115</td>
<td>115</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>124</td>
<td>71.6</td>
<td>124</td>
<td>71.6</td>
<td>123</td>
<td>71.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>185</td>
<td>64.1</td>
<td>185</td>
<td>64.2</td>
<td>186</td>
<td>63.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>151</td>
<td>95.7</td>
<td>151</td>
<td>95.7</td>
<td>151</td>
<td>95.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>100</td>
<td>174</td>
<td>101</td>
<td>174</td>
<td>101</td>
<td>174</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>113</td>
<td>80.8</td>
<td>114</td>
<td>80.1</td>
<td>113</td>
<td>80.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>110</td>
<td>143</td>
<td>109</td>
<td>144</td>
<td>110</td>
<td>143</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
## Lenovo Global Technology

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

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

### SPECspeed2017 fp_base = 118

### SPECspeed2017 fp_peak = Not Run

### 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 9bcede8f2999c3361f64985e45859ea9
  - running on localhost.localdomain Sun Apr 28 19:13:30 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

- From /proc/cpuinfo
  - model name: Intel(R) Xeon(R) Gold 5218 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 5218 CPU @ 2.30GHz
  - Stepping: 6
  - CPU MHz: 2677.484
  - CPU max MHz: 3900.0000
  - CPU min MHz: 1000.0000
  - BogoMIPS: 4600.00

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST550
(2.30 GHz, Intel Xeon Gold 5218)

<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>

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

**Platform Notes (Continued)**

Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 22528K
NUMA node0 CPU(s): 0-15,32-47
NUMA node1 CPU(s): 16-31,48-63
Flags: fpu vme de pse mce cmov lmx 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 pge mce cx8 apic sse3 sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpb cat_l3 cdp_l3 intel_pt ssbd mba ibrs ibp stibp ibrs_enhanced tpr_shadow vnni flexpriority vpid vpd fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bcd avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts hwp act_window hwp_epp hwp_kkg req pku ospke avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities

From /proc/cpuinfo

cache data

cache size : 22528 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 14 15 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
node 0 size: 196281 MB
node 0 free: 190316 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56
node 1 size: 196608 MB
node 1 free: 191585 MB
node distances:

node 0 1 0: 10 21 1: 21 10

From /proc/meminfo

MemTotal: 395879708 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*

os-release:
NAME="Red Hat Enterprise Linux Server"

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST550
(2.30 GHz, Intel Xeon Gold 5218)

SPECspeed2017_fp_base = 118
SPECspeed2017_fp_peak = Not Run

Platform Notes (Continued)

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)

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 28 18:06

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

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

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 -[00E135M-2.10]- 01/16/2019
Memory:
12x Samsung M393A4K40CB2-CVF 32 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)
Lenovo Global Technology
ThinkSystem ST550
(2.30 GHz, Intel Xeon Gold 5218)

SPEC CPU2017 Floating Point Speed Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

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

SPECspeed2017_fp_base = 118
SPECspeed2017_fp_peak = Not Run

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

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

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)
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.
==============================================================================
CC  621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
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.

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

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST550
(2.30 GHz, Intel Xeon Gold 5218)

| SPECspeed2017_fp_base = 118 |
| SPECspeed2017_fp_peak = Not Run |

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

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

---

**Base Compiler Invocation (Continued)**

Benchmarks using Fortran, C, and C++:
`icc -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
**Lenovo Global Technology**  
ThinkSystem ST550  
(2.30 GHz, Intel Xeon Gold 5218)

<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>

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

<table>
<thead>
<tr>
<th>Test Date</th>
<th>Apr-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Nov-2018</td>
</tr>
</tbody>
</table>

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:
- http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.xml

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2019-04-28 07:13:29-0400.  