## Lenovo Global Technology

ThinkSystem ST550  
(2.20 GHz, Intel Xeon Platinum 8253)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base =</th>
<th>112</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak =</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### CPU2017 License: 9017
Test Date: Apr-2019  
Test Sponsor: Lenovo Global Technology  
Tested by: Lenovo Global Technology  
Hardware Availability: Apr-2019  
Software Availability: Nov-2018

### Hardware

| Threads |  
|---------|---|
| 603.bwaves_s | 32 |
| 607.cactuBSSN_s | 32 |
| 619.lbm_s | 32 |
| 621.wrf_s | 32 |
| 627.cam4_s | 32 |
| 628.pop2_s | 32 |
| 638.imagick_s | 32 |
| 644.nab_s | 32 |
| 649.fotonik3d_s | 32 |
| 654.roms_s | 32 |

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base (112)</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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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>
<td>621.wrf_s</td>
</tr>
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<tr>
<td>628.pop2_s</td>
</tr>
<tr>
<td>638.imagick_s</td>
</tr>
<tr>
<td>644.nab_s</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
</tr>
<tr>
<td>654.roms_s</td>
</tr>
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</table>

### 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 OOE135M 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 |

### CPU Name: Intel Xeon Platinum 8253  
Max MHz.: 3000  
Nominal: 2200  
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)  
Storage: 1 x 480 GB SATA SSD  
Other: None
Lenovo Global Technology
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SPECspeed2017_fp_base = 112
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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>
<th>Ratio</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Base</td>
<td></td>
<td>Peak</td>
<td></td>
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<td>603.bwaves_s</td>
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<td>120</td>
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<td>495</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>117</td>
<td>141</td>
<td>118</td>
<td>142</td>
<td>118</td>
</tr>
<tr>
<td>619.lbm_s</td>
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<td>59.0</td>
<td>88.8</td>
<td>59.0</td>
<td>88.8</td>
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<td>627.cam4_s</td>
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<td>64.9</td>
<td>137</td>
<td>64.8</td>
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<tr>
<td>628.pop2_s</td>
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<td>59.0</td>
<td>202</td>
<td>58.7</td>
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<td>58.9</td>
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<tr>
<td>638.imagick_s</td>
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<td>84.1</td>
<td>171</td>
<td>84.4</td>
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<tr>
<td>644.nab_s</td>
<td>32</td>
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<td>155</td>
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<td>155</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>115</td>
<td>79.5</td>
<td>114</td>
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<td>112</td>
<td>141</td>
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<td>142</td>
<td>110</td>
<td>143</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 112
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 9bcede8f2999c33d61f64985e45859ea9
running on localhost.localdomain Thu Apr 18 20:10:32 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) Platinum 8253 CPU @ 2.20GHz
  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) Platinum 8253 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2035.510
CPU max MHz: 3000.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00

(Continued on next page)
## Lenovo Global Technology

**ThinkSystem ST550**

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

### SPEC CPU2017 Floating Point Speed Result

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**Lenovo Global Technology (2.20 GHz, Intel Xeon Platinum 8253)**

### 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 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 eagerfpup ni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpmr pdcm pcid dca 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 ibib ibs_enhanced tpr_shadow vmmi flexpriority ept vpid fsgsb dts_adj립 hle avx2 smep bmi2 erm invpcid rtms cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves opt xgetbv1 cqm_llc cqm Occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts hwp wwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities

/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: 191498 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 57 58 59 60 61 62 63
- node 1 size: 196608 MB
- node 1 free: 191587 MB
- node distances:
  - node 0 1
    - 0: 10 21
    - 1: 21 10

From /proc/meminfo

- MemTotal: 395879704 KB
- HugePages_Total: 0
- Hugepagesize: 2048 KB

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

- NAME="Red Hat Enterprise Linux Server"

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST550
(2.20 GHz, Intel Xeon Platinum 8253)

SPEC CPU2017 Floating Point Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECspeed2017_fp_base = 112
SPECspeed2017_fp_peak = Not Run

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

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 18 20:08

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

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sdb2</td>
<td>btrfs</td>
<td>442G</td>
<td>29G</td>
<td>412G</td>
<td>7%</td>
<td>/</td>
</tr>
</tbody>
</table>

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

(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**

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<table>
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## Compiler Version Notes (Continued)

```plaintext
FC  607.cactuBSSN_s(base)
```

```plaintext
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.
```

```plaintext
FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
```

```plaintext
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.
```

```plaintext
CC  621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
```

```plaintext
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)
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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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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 2019-04-18 08:10:32-0400.  