## SPEC® CPU2017 Floating Point Speed Result

**Lenovo Global Technology**  
ThinkSystem ST550  
(1.90 GHz, Intel Xeon Gold 6238T)

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### Test Result

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>126</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### System Information

**Lenovo Global Technology**  
**Test Date:** Apr-2019  
**Hardware Availability:** Apr-2019  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Nov-2018

### Threads

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base (126)</th>
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<tbody>
<tr>
<td>603.bwaves_s 44</td>
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<tr>
<td>607.cactuBSSN_s 44</td>
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<tr>
<td>619.lbm_s 44</td>
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<tr>
<td>621.wrf_s 44</td>
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<tr>
<td>627.cam4_s 44</td>
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<tr>
<td>628.pop2_s 44</td>
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<tr>
<td>638.imagick_s 44</td>
</tr>
<tr>
<td>644.nab_s 44</td>
</tr>
<tr>
<td>649.fotonik3d_s 44</td>
</tr>
<tr>
<td>654.roms_s 44</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6238T  
- **Max MHz.:** 3700  
- **Nominal:** 1900  
- **Enabled:** 44 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:** 30.25 MB I+D on chip per chip  
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)  
- **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
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SPECspeed2017_fp_base = 126
SPECspeed2017_fp_peak = Not Run

Results Table

<table>
<thead>
<tr>
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</tbody>
</table>

SPECspeed2017_fp_base = 126
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  
**Tested by:** Lenovo Global Technology  

**Test Date:** Apr-2019  
**Hardware Availability:** Apr-2019  
**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-ic19.0ul/bin/sysinfo

- **Revision:** r5974 of 2018-05-19 9bcde8f2999c3361f64985e45859ea9

- **Running on:** localhost.localdomain Thu Apr 25 23:03:25 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 6238T CPU @ 1.90GHz
    - 2 "physical id"s (chips)
    - 88 "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: 22
      - siblings: 44
      - physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
      - physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

  - **From lscpu:**
    - **Architecture:** x86_64
    - **CPU op-mode(s):** 32-bit, 64-bit
    - **Byte Order:** Little Endian
    - **CPU(s):** 88
    - **On-line CPU(s) list:** 0-87
    - **Thread(s) per core:** 2
    - **Core(s) per socket:** 22
    - **Socket(s):** 2
    - **NUMA node(s):** 2
    - **Vendor ID:** GenuineIntel
    - **CPU family:** 6
    - **Model:** 85
    - **Model name:** Intel(R) Xeon(R) Gold 6238T CPU @ 1.90GHz
    - **Stepping:** 6
    - **CPU MHz:** 800.054
    - **CPU max MHz:** 3700.0000
    - **CPU min MHz:** 800.0000
    - **BogoMIPS:** 3800.00

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

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<table>
<thead>
<tr>
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<th>Lenovo Global Technology</th>
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</tr>
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<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
</tbody>
</table>

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**Platform Notes (Continued)**

Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 30976K  
NUMA node0 CPU(s): 0-21, 44-65  
NUMA node1 CPU(s): 22-43, 66-87  
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 eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ebti cld ccm cpuid  
/proc/cpuinfo cache data  
  cache size : 30976 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 16 17 18 19 20 21 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65   
  node 0 size: 97976 MB  
  node 0 free: 94908 MB  
  node 0 cpus: 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65   
  node 1 size: 98304 MB  
  node 1 free: 95688 MB  
  node distances:  
    node 0 1  
        0: 10 21  
        1: 21 10

From /proc/meminfo  
  MemTotal: 197697908 kB  
  HugePages_Total: 0  
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*  
  os-release:  
    NAME="Red Hat Enterprise Linux Server"

---

(Continued on next page)
**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

```
runtime 3 Apr 25 23:00
```

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

```
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 SMI BIOS" standard.

- BIOS Lenovo -[00E135T-2.10]- 03/21/2019
- Memory: 12x SK Hynix HMA82GR7CJR8N-WM 16 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)
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Software Availability: Nov-2018

Specspeed2017_fp_base = 126
Specspeed2017_fp_peak = Not Run

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.
==============================================================================
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.
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

(Continued on next page)
### Base Compiler Invocation (Continued)

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

```bash
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 |
| Hardware Availability: | Apr-2019 |
| Software Availability: | Nov-2018 |

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 2019-04-25 11:03:24-0400.