### Lenovo Global Technology

**Test Type:** SPEC CPU®2017 Floating Point Speed Result

**Hardware**

- **CPU Name:** Intel Xeon Gold 6238M
- **Max MHz:** 3700
- **Nominal:** 2100
- **Enabled:** 88 cores, 4 chips, 2 threads/core
- **Orderable:** 2.4 chips
- **Cache L1:** 32 KB I+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:** 768 GB (48 x 16 GB 2Rx8 PC4-2933Y-R)
- **Storage:** 800 GB tmpfs
- **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 19.0.4.227 of Intel C/C++
  
  Compiler for Linux;

  Fortran: Version 19.0.4.227 of Intel Fortran

- **Parallel:** Yes

- **Firmware:** Lenovo BIOS Version IVE142E 2.30 released Aug-2019 tested as IVE141E 2.30 Jul-2019

- **File System:** tmpfs

- **System State:** Run level 3 (multi-user)

- **Base Pointers:** 64-bit

- **Peak Pointers:** Not Applicable

- **Other:** None

- **Power Management:** --

---

**Lenovo Global Technology**

ThinkSystem SN850

(2.10 GHz, Intel Xeon Gold 6238M)

**Test Date:** Sep-2019

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

---

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 198</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak = Not Run</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (198)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>68</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>79</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>91</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>125</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>150</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64.0</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>196</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>351</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>119</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>289</td>
</tr>
</tbody>
</table>

---

**Software Availability:** May-2019

**Hardware Availability:** Jul-2019
Lenovo Global Technology
ThinkSystem SN850
(2.10 GHz, Intel Xeon Gold 6238M)

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

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>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>88</td>
<td>65.9</td>
<td>895</td>
<td>68.0</td>
<td>868</td>
<td>66.2</td>
<td>891</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>88</td>
<td>83.0</td>
<td>201</td>
<td>83.0</td>
<td>201</td>
<td>83.0</td>
<td>200</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>88</td>
<td>31.9</td>
<td>164</td>
<td>31.3</td>
<td>167</td>
<td>31.3</td>
<td>167</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>88</td>
<td>100</td>
<td>132</td>
<td>99.5</td>
<td>133</td>
<td>99.1</td>
<td>133</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>88</td>
<td>58.9</td>
<td>150</td>
<td>59.0</td>
<td>150</td>
<td>59.0</td>
<td>150</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>88</td>
<td>185</td>
<td>64.3</td>
<td>186</td>
<td>63.7</td>
<td>186</td>
<td>64.0</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>88</td>
<td>73.8</td>
<td>196</td>
<td>73.4</td>
<td>196</td>
<td>73.1</td>
<td>197</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>88</td>
<td>49.8</td>
<td>351</td>
<td>49.6</td>
<td>352</td>
<td>49.8</td>
<td>351</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>88</td>
<td>77.3</td>
<td>118</td>
<td>76.4</td>
<td>119</td>
<td>76.2</td>
<td>120</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>88</td>
<td>54.5</td>
<td>289</td>
<td>54.5</td>
<td>289</td>
<td>54.6</td>
<td>288</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 198
SPECspeed®2017_fp_peak = Not Run

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"
Tmpfs filesystem can be set with:
    mount -t tmpfs -o size=800g tmpfs /home
Process tuning setting:
    echo 50000 > /proc/sys/kernel/sched_cfs_bandwidth_slice_us

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-ic19.0u4/lib/intel64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-799X 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
NA: 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.

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN850
(2.10 GHz, Intel Xeon Gold 6238M)

SPECspeed®2017_fp_base = 198
SPECspeed®2017_fp_peak = Not Run

CPU2017 License: 9017
Test Date: Sep-2019
Test Sponsor: Lenovo Global Technology
Hardware Availability: Jul-2019
Tested by: Lenovo Global Technology
Software Availability: May-2019

General Notes (Continued)
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 Custom Mode
Memory Power Management set to Automatic
Energy Efficient Turbo set to Disable
C-States set to Disable
Page Policy set to Adaptive
Trusted Execution Technology set to Enable
Stale AtS set to Enable

Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd0f2999c33d61f64985e45859ea9
running on localhost.localdomain Sat Sep 7 09:10:50 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 6238M CPU @ 2.10GHz
        4 "physical id"s (chips)
        176 "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
    physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
    physical 3: 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): 176
    On-line CPU(s) list: 0-175
    Thread(s) per core: 2
    Core(s) per socket: 22
    Socket(s): 4
    NUMA node(s): 4
    Vendor ID: GenuineIntel
    CPU family: 6

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

**ThinkSystem SN850**  
*(2.10 GHz, Intel Xeon Gold 6238M)*

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Lenovo Global Technology</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>

**SPECspeed®2017_fp_base = 198**

**SPECspeed®2017_fp_peak = Not Run**

---

**Platform Notes (Continued)**

```
Model: 85
Model name: Intel(R) Xeon(R) Gold 6238M CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2100.000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 30976K
NUMA node0 CPU(s): 0-21 88-109
NUMA node1 CPU(s): 22-43 110-131
NUMA node2 CPU(s): 44-65 132-153
NUMA node3 CPU(s): 66-87 154-175
Flags:  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
        aperfmpref eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
        fma cx16 xtrm pdcm pcd pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
        xsave avx f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 intel_pinn
        intel_pt ssbd mba ibrs ibpb stibp ibrsenhanced trp_shadow vmni flexpriority ept
        vpid fsbgbase tsc_adjust bm1l hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
        avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
        xsavec xgetbv1 cqm_llc cqm_occmap llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln
        pts hwp epp pku ospke avx512_vnni spec_ctrl intel_stibp flush_l1d arch_capabilities
```

From `numactl --hardware` WARNING: a numactl 'node' might or might not correspond to a physical chip.

```
available: 4 nodes (0-3)
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 88 89 90 91 92 93
         94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109
node 0 size: 196277 MB
node 0 free: 186448 MB
node 1 cpus: 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 110 111
         112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131
node 1 size: 196308 MB
node 1 free: 192114 MB
node 2 cpus: 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 132 133
         134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153
node 2 size: 196308 MB
node 2 free: 183526 MB
node 3 cpus: 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 154 155
         156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175
node 3 size: 196308 MB
```

(Continued on next page)
Lenovo Global Technology

ThinkSystem SN850
(2.10 GHz, Intel Xeon Gold 6238M)

SPECspeed®2017_fp_base = 198
SPECspeed®2017_fp_peak = Not Run

Platform Notes (Continued)

node 3 free: 192109 MB
node distances:
node  0  1  2  3
0:  10 21 21 21
1:  21 10 21 21
2:  21 21 10 21
3:  21 21 21 10

From /proc/meminfo
MemTotal:       792236448 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
NAME="Red Hat Enterprise Linux Server"
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 Sep 7 09:08

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
Filesystem     Type   Size  Used Avail Use% Mounted on
tmpfs      tmpfs  800G  8.3G  792G  2%  /home

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.

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN850
(2.10 GHz, Intel Xeon Gold 6238M)

SPECspeak®2017_fp_base = 198
SPECspeak®2017_fp_peak = Not Run

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

Test Date: Sep-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Platform Notes (Continued)

BIOS Lenovo -[IVE141E-2.30]- 07/02/2019
Memory:
48x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

C | 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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++, C, Fortran | 607.cactuBSSN_s(base)
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran | 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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran, C | 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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416

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

ThinkSystem SN850  
(2.10 GHz, Intel Xeon Gold 6238M)

<table>
<thead>
<tr>
<th>CPU2017 License: 9017</th>
<th>Test Date: Sep-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: Lenovo Global Technology</td>
<td>Hardware Availability: Jul-2019</td>
</tr>
<tr>
<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: May-2019</td>
</tr>
</tbody>
</table>

---

**Compiler Version Notes (Continued)**

Copyright (C) 1985-2019 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
```

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
```

---

(Continued on next page)
Lenovo Global Technology
ThinkSystem SN850
(2.10 GHz, Intel Xeon Gold 6238M)

SPECspeed®2017_fp_base = 198
SPECspeed®2017_fp_peak = Not Run

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

Test Date: Sep-2019
Hardware Availability: Jul-2019
Software Availability: May-2019

Base Optimization Flags (Continued)

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-D.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-D.xml

SPEC CPU and SPECspeed are registered trademarks 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 CPU®2017 v1.0.5 on 2019-09-06 21:10:49-0400.
Originally published on 2019-10-01.