Lenovo Global Technology
ThinkSystem SR860
(1.90 GHz, Intel Xeon Gold 6238T)

<table>
<thead>
<tr>
<th>Threads</th>
<th>603. bwaves_s</th>
<th>607. cactuBSSN_s</th>
<th>619. lbm_s</th>
<th>621. wrf_s</th>
<th>627. cam4_s</th>
<th>628. pop2_s</th>
<th>638. imagick_s</th>
<th>644. nab_s</th>
<th>649. fotonik3d_s</th>
<th>654. roms_s</th>
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<tr>
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<tr>
<td>SPECspeed®2017_fp_base</td>
<td>191</td>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
<td></td>
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</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 6238T
- **Max MHz:** 3700
- **Nominal:** 1900
- **Enabled:** 88 cores, 4 chips
- **Orderable:** 2,4 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
- **Other:** None
- **Memory:** 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)
- **Storage:** 800 GB tmpfs
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 12 SP4 (x86_64)
- **Kernel:** 4.12.14-94.41-default
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++
- **Compiler for Linux:** Intel Fortran
- **Compiler for Fortran:** Compiler for Linux
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE141E 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:** BIOS set to prefer performance at the cost of additional power usage
SPEC CPU®2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SR860
(1.90 GHz, Intel Xeon Gold 6238T)

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

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

Results Table

<table>
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<tr>
<th>Benchmark</th>
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</tbody>
</table>

SPECspeed®2017_fp_base = 191
SPECspeed®2017_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"
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
echo 240000000 > /proc/sys/kernel/sched_latency_ns
echo 5000000 > /proc/sys/kernel/sched_migration_cost_ns
echo 100000000 > /proc/sys/kernel/sched_min_granularity_ns
echo 150000000 > /proc/sys/kernel/sched_wakeup_granularity_ns

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=none,compact"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.0-ic19.0u4/lib/intel64"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
Transparent Huge Pages disabled by default
echo never > /sys/kernel/mm/transparent_hugepage/enabled
echo never > /sys/kernel/mm/transparent_hugepage/defrag
Prior to runcpu invocation
Filesystem page cache synced and cleared with:

(Continued on next page)
Lenovo Global Technology
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| SPECspeed®2017_fp_base = | 191 |
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| CPU2017 License: | 9017 |
| Test Sponsor: | Lenovo Global Technology |
| Test Date: | Nov-2019 |
| Tested by: | Lenovo Global Technology |
| Hardware Availability: | Apr-2019 |
| Software Availability: | May-2019 |

General Notes (Continued)

```bash
csync; 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.

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 and then set it to Custom Mode
Hyper-Threading set to Disable
Adjacent Cache Prefetch set to Disable
MONITOR/MWAIT set to Enable

```
Sysinfo program /home/cpu2017-1.1.0-ic19.0u4/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011
running on linux-700n Thu Nov 21 08:03:00 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 6238T CPU @ 1.90GHz
  4 "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 : 22
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): 88
```

(Continued on next page)
Lenovo Global Technology
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**SPECspeed®2017_fp_base = 191**
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

**Platform Notes (Continued)**

On-line CPU(s) list: 0-87
Thread(s) per core: 1
Core(s) per socket: 22
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6238T CPU @ 1.90GHz
Stepping: 6
CPU MHz: 1900.000
CPU max MHz: 3700.0000
CPU min MHz: 800.0000
BogoMIPS: 3800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 30976K
NUMA node0 CPU(s): 0-21
NUMA node1 CPU(s): 22-43
NUMA node2 CPU(s): 44-65
NUMA node3 CPU(s): 66-87

Flags: fpu vmx de pse tsc msr cr8 386 pm xsave cx8 apic sm tsc mt ms x2apic msr aarch64 redxcenv cpuidutdown lahf_lm abal_hle avx2 smep bmi2 erms invpcid_rtm cqm mpx rdtsid_avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavevc xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pme pnu ospke avx512_vnni flush_l1d arch_capabilities

/cache/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: 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
    node 0 size: 386638 MB
    node 0 free: 386239 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
    node 1 size: 387057 MB
    node 1 free: 373963 MB

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

**ThinkSystem SR860**  
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<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
<th>Test Date:</th>
<th>Nov-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
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<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>May-2019</td>
</tr>
</tbody>
</table>

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**Platform Notes (Continued)**

```
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
node 2 free: 386828 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
node 3 free: 386775 MB
node distances:
   node 0 1 2 3
   0: 10 21 21 31
   1: 21 10 31 21
   2: 21 31 10 21
   3: 31 21 21 10
```

From `/proc/meminfo`

```
MemTotal:       1584955656 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

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

```
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 4
  # This file is deprecated and will be removed in a future service pack or release.
  # Please check /etc/os-release for details about this release.
  os-release:
    NAME="SLES"
    VERSION="12-SP4"
    VERSION_ID="12.4"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp4"

uname -a:
  x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

- **CVE-2018-3620 (L1 Terminal Fault):** Not affected
- **Microarchitectural Data Sampling:** No status reported
- **CVE-2017-5754 (Meltdown):** Not affected
- **CVE-2018-3639 (Speculative Store Bypass):** Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- **CVE-2017-5753 (Spectre variant 1):** Mitigation: __user pointer sanitization
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Indirect Branch Restricted

(Continued on next page)
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SPECSpeed®2017_fp_base = 191
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CPU2017 License: 9017
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Hardware Availability: Apr-2019
Software Availability: May-2019

Platform Notes (Continued)
Speculation, IBPB, IBRS_FW

run-level 3 Nov 21 08:00

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u4
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 800G 8.3G 792G 2% /home

From /sys/devices/virtual/dmi/id
BIOS: Lenovo -[TEE141E-2.30]- 07/02/2019
Vendor: Lenovo
Product: ThinkSystem SR860 -[7X7025Z000]-
Product Family: ThinkSystem
Serial: none

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.
Memory:
48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

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
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----------------------------------------------------------------------------------------------------------------------

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
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SPECspeed\textsuperscript{2017\_fp\_base} = 191
SPECspeed\textsuperscript{2017\_fp\_peak} = Not Run

---

**Compiler Version Notes (Continued)**

Fortran | 603.bwaves\_s(base) 649.fotonik3d\_s(base) 654.roms\_s(base)
---

Intel\textregistered\ Fortran Intel\textregistered\ 64 Compiler for applications running on Intel\textregistered\ 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\textregistered\ Fortran Intel\textregistered\ 64 Compiler for applications running on Intel\textregistered\ 64, Version 19.0.4.227 Build 20190416
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---

**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

(Continued on next page)
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Base Portability Flags (Continued)
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

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-F.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-F.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 CPU®2017 v1.1.0 on 2019-11-20 19:03:00-0500.
Report generated on 2019-12-11 12:48:00 by CPU2017 PDF formatter v6255.
Originally published on 2019-12-11.